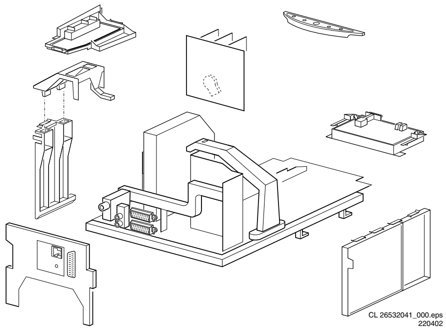
Colour Television **Chassis**

EM5E
AA

Service
Service
Service



Service Manual

Contents **Page**

1. Technical Specifications, Connections and Chassis Overview 2
2. Safety & Maintenance Instructions, Warnings and Notes 5
3. Directions for Use 7
4. Mechanical Instructions 21
5. Service Modes, Error Codes and Faultfinding 25
6. *Block Diagram, Testpoints, and Overviews*
   Wiring Diagram 37
   Block Diagram Supply and Deflection 38
   Block Diagram Video 39
   Block Diagram Audio 1 (Excl Wireless Audio) 40
   Block Diagram Audio 2 (Wireless Audio) 41
   I²C-IC Overview 42
   Supply Lines Overview 43
   Testpoint Overview LSP & CRT/Auto SCAVEM 44
   Testpoint Overview SSB 45
7. *Electrical Diagrams and PWB's* *Diagram* *PWB*
   Main Supply (Diagram A1) 46 55-60
   Stand-by Supply (Diagram A2) 47 55-60
   Line Deflection (Diagram A3) 48 55-60
   Frame Deflection & E/W Drive (Diagram A4) 49 55-60
   Rotation Circuitry (Diagram A5) 50 55-60
   Audio Amplifier (Diagram A6) 51 55-60
   Tuner SIMM connector (Female) (Diagram A8) 52 55-60
   Receiver (Diagram A9) 53 55-60
   Front (Diagram A10) 53 55-60
   Inputs/Outputs (Diagram A11) 54 55-60
   SIMM connector (Male) (Diagram B1) 61 71-80
   IF, I/O Videoprocessing (Diagram B2) 62 71-80
   PICNIC (Diagram B3A) 63 71-80
   Diversity Tables SSB 64 71-80
   Falconic (Diagram B3B) 65 71-80
   Eagle (Diagram B3C) 66 71-80
   HOP (Diagram B4) 67 71-80
   OTC (Diagram B5) 68 71-80
   Audio Demodulator (Diagram B6) 69 71-80
   Anti Moiré (Diagram B9) 70 71-80
   Headphone Amplifier (Diagram B10) 70 71-80
   Mains Switch Panel (Diagram E) 81 82
   CRT (Diagram F1) 83 85-86
   CRT/Auto Scavem Panel (Diagram F2) 84 85-86
   DC Shift Panel (Diagram G) 87 87
   I/O 3rd SCART Panel (Diagram H) 88 89
   VDAF + 2nd Orders Panel (Diagram I) 90 91
   Side I/O Panel (Diagram O) 92 93
   Top Control (Diagram P) 94 94
   Auto SCAVEM (Diagram SC1) 95 96
8. Alignments 97
9. Circuit Description 104
   Abbreviation List 124
   IC Data Sheets 126
10 Spare Parts List 127

©Copyright 2002 Philips Consumer Electronics B.V. Eindhoven, The Netherlands.
All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.

Published by WO 0264 Service PaCE Printed in the Netherlands Subject to modification EN 3122 785 12560

PHILIPS

1. Technical Specifications, Connections and Chassis Overview

1.1 Technical Specifications

1.1.1 Vision

Display type : CRT, Real Flat WS
Screen size : 28” (70 cm)
: 32" (82 cm)
: 36” (92 cm)
Tuning system : PLL
Colour systems : PAL: B/G, D/K, I
: SECAM: B/G, D/K, L/L’
: NTSC: playback only
Channel selections : 100 presets
: UVSH
Aerial input : 75 Ω, IEC-type

1.1.2 Sound

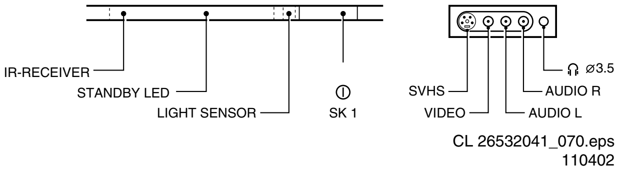
Sound systems : FM-mono, AM-mono
: FM-stereo: B/G, Czech
: NICAM: B/G, D/K, I, L
Maximum power : 4 x 15 W_{rms} (int.)

1.1.3 Miscellaneous

Mains voltage : 220 - 240 V
Mains frequency : 50 / 60 Hz
Ambient temperature : +5 to +45 deg. C
Maximum humidity : 90 % R.H.
Power consumption :
Normal operation : ≈ 130 W
Standby : < 1 W

1.2 Connections

1.2.1 Front View / Side Connections



CL 26532041_070.eps
110402

Figure 1-1 Front View and Side I/O

Hosiden: SVHS - In

1	- Y	Ground	⏚
2	- C	Ground	⏚
3	- Y	1 V_{pp} / 75 Ω	➔⊙
4	- C	0.3 V_{pp} / 75 Ω	➔⊙

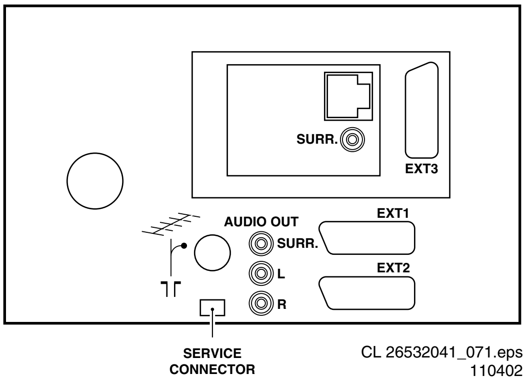
Cinch: In

1	- CVBS	1 V_{pp} / 75 Ω	➔⊙◎
2	- Audio - L	0.5 V_{rms} / 10 kΩ	➔⊙◎
3	- Audio - R	0.5 V_{rms} / 10 kΩ	➔⊙◎

Mini Jack: Headphone - Out

- Headphone	32 - 600 Ω / 10 mW	◎ 3.5mm

1.2.2 Rear Connections



CL 26532041_071.eps
110402

Figure 1-2 Rear View

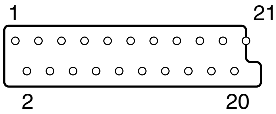
Aerial - In

- IEC-type	Coax, 75 Ω	╖╓

Cinch: Audio - Out

- Audio - R	0.5 V_{rms} / 1 kΩ	⊙➔◎
- Audio - L	0.5 V_{rms} / 1 kΩ	⊙➔◎

External 1: RGB/YUV and CVBS - In/Out

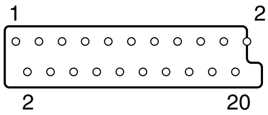


CL96532137_056.eps
171199

Figure 1-3 SCART connector

1	- Audio - R	0.5 V_{rms} / 1 kΩ	⊙➔
2	- Audio - R	0.5 V_{rms} / 10 kΩ	➔⊙
3	- Audio - L	0.5 V_{rms} / 1 kΩ	⊙➔
4	- Audio	Ground	⏚
5	- Audio	Ground	⏚
6	- Audio - L	0.5 V_{rms} / 10 kΩ	➔⊙
7	- Blue / U	0.7 V_{pp} / 75 Ω	➔⊙
8	- CVBS-status	0 - 1.3 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9	- Video	Ground	⏚
10	-		
11	- Green / Y	0.7 V_{pp} / 75 Ω	➔⊙
12	-		
13	- Video	Ground	⏚
14	- Video	Ground	⏚
15	- Red / V	0.7 V_{pp} / 75 Ω	➔⊙
16	- Status / FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	➔⊙
17	- Video	Ground	⏚
18	- Video	Ground	⏚
19	- CVBS-out	1 V_{pp} / 75 Ω	⊙➔
20	- CVBS-in	1 V_{pp} / 75 Ω	➔⊙
21	- Shielding	Ground	⏚

External 2: CVBS and SVHS - In (for VCR)

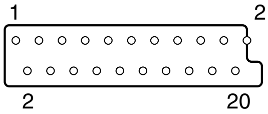


CL96532137_056.eps
171199

Figure 1-4 SCART connector

1	- Audio - R	0.5 V_{rms} / 1 kΩ	○→
2	- Audio - R	0.5 V_{rms} / 10 kΩ	→○
3	- Audio - L	0.5 V_{rms} / 1 kΩ	○→
4	- Audio	Ground	⏚
5	- Audio	Ground	⏚
6	- Audio - L	0.5 V_{rms} / 10 kΩ	→○
7	- C-out	0.7 V_{pp} / 75 Ω	○→
8	- CVBS-Status	0 - 1.3 V: INT	
		4.5 - 7 V: EXT 16:9	
		9.5 - 12 V: EXT 4:3	
9	- Video	Ground	⏚
10	- Easy Link	(P50)	→○
11	-		
12	-		
13	- Video	Ground	⏚
14	- Video	Ground	⏚
15	- C-in	0.7 V_{pp} / 75 Ω	→○
16	-		
17	- Video	Ground	⏚
18	- Video	Ground	⏚
19	- CVBS-out	1 V_{pp} / 75 Ω	○→
20	- Y / CVBS-in	1 V_{pp} / 75 Ω	→○
21	- Shielding	Ground	⏚

External 3: RGB and CVBS - In



CL96532137_056.eps
171199

Figure 1-5 SCART connector

1	- Audio - R	0.5 V_{rms} / 1 kΩ	○→
2	- Audio - R	0.5 V_{rms} / 10 kΩ	→○
3	- Audio - L	0.5 V_{rms} / 1 kΩ	○→
4	- Audio	Ground	⏚
5	- Audio	Ground	⏚
6	- Audio - L	0.5 V_{rms} / 10 kΩ	→○
7	- Blue-in	0.7 V_{pp} / 75 Ω	→○
8	- CVBS-status	0 - 1.3 V: INT	
		4.5 - 7 V: EXT 16:9	
		9.5 - 12 V: EXT 4:3	
9	- Video	Ground	⏚
10	-		
11	- Green-in	0.7 V_{pp} / 75 Ω	→○
12	-		
13	- Video	Ground	⏚
14	- Video	Ground	⏚
15	- Red-in	0.7 V_{pp} / 75 Ω	→○
16	- Status / FBL	0 - 0.4 V: INT	
		1 - 3 V: EXT / 75 Ω	→○
17	- Video	Ground	⏚
18	- Video	Ground	⏚
19	-		
20	- CVBS-in	1 V_{pp} / 75 Ω	→○
21	- Shielding	Ground	⏚

RJ45: Wireless Surround Transmitter - Out

1	- SDA2_TM	Signal	→○○→
2	- SCL2_TM	Signal	○→
3	- GND	Ground	⏚
4	- I^2C_MUTE	Signal	○→
5	- 15V	Supply	○→
6	- AUDIO_SL_S_TM	Signal	○→
7	- GND_AUD	Ground	⏚
8	- PILOT_MUTE	Signal	○→

Jack: Surround - Out

1	- Audio	0.2 - 2 V_{rms} / 10 kΩ	◎ 3.5mm ○→

1.3 Chassis Overview

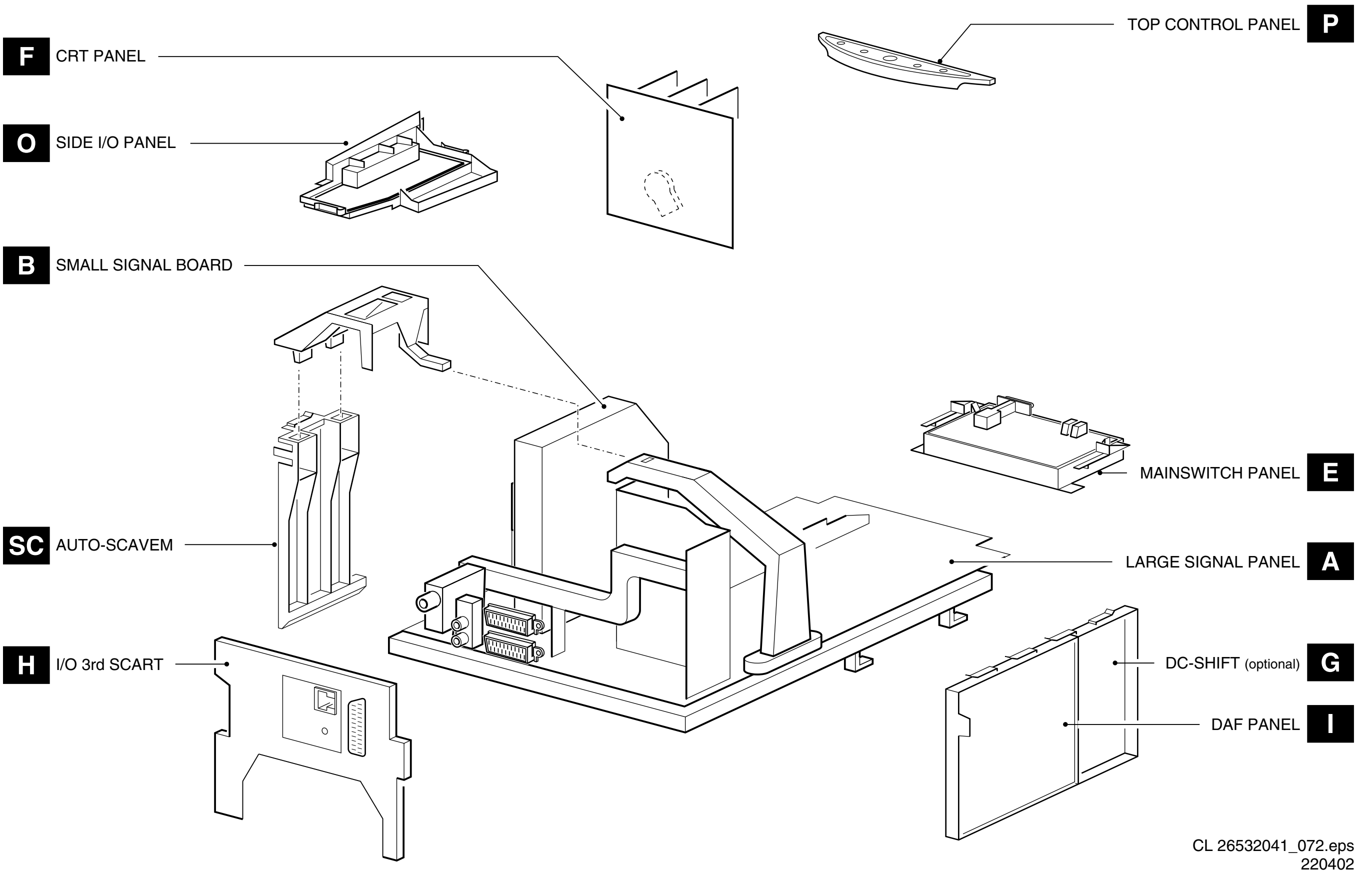

F CRT PANEL
O SIDE I/O PANEL
B SMALL SIGNAL BOARD
SC AUTO-SCAVEM
H I/O 3rd SCART
TOP CONTROL PANEL P
MAINSWITCH PANEL E
LARGE SIGNAL PANEL A
DC-SHIFT (optional) G
DAF PANEL I
CL 26532041_072.eps
220402

Figure 1-6 PWB location

2. Safety and Maintenance Instructions, Warnings, and Notes

2.1 Safety Instructions

Safety regulations require that **during** a repair:

- Due to the chassis concept, a very large part of the circuitry (incl. deflection) is 'hot'. Therefore, connect the set to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, you must return the set in its original condition. Pay, in particular, attention to the following points:

- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current is flowing. In particular this is valid for the:
  1. Pins of the line output transformer (LOT).
  2. Fly-back capacitor(s).
  3. S-correction capacitor(s).
  4. Line output transistor.
  5. Pins of the connector with wires to the deflection coil.
  6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.

- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the mains cord for external damage.
- Check the strain relief of the mains cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the mains plug and the secondary side (only for sets that have an isolated power supply). Do this as follows:
  1. Unplug the mains cord and connect a wire between the two pins of the mains plug.
  2. Turn on the main power switch (keep the mains cord unplugged!).
  3. Measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection of the set. The reading should be between 4.5 MΩ and 12 MΩ.
  4. Switch the TV 'off' and remove the wire between the two pins of the mains plug.
- Check the cabinet for defects, to prevent the possibility of the customer touching any internal parts.

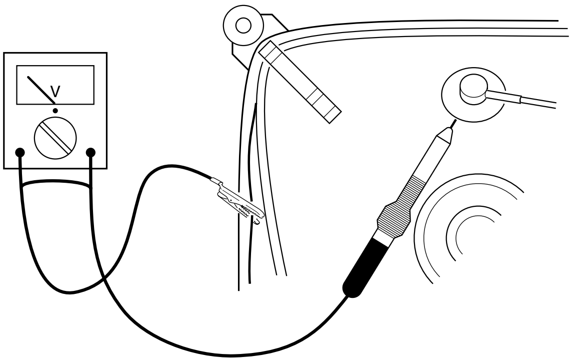
2.2 Maintenance Instructions

We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the 'general repair instruction' noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in Fig. 2-1, to discharge the picture tube. Use a high voltage probe and a multi-meter (position VDC). Discharge until the meter reading is 0 V (after approx. 30 s).



CL96532156_040.eps
140501

Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, symbol w). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this potential. Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and ground cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Together with the deflection unit and any multi-pole unit, flat square picture tubes form an integrated unit. The deflection and the multi-pole units are set optimally at the factory. We do not recommend adjusting this unit during repair.
- Be careful during measurements in the high voltage section and on the picture tube.
- Never replace modules or other components while the unit is 'on'.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.4 Notes

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz (PAL) or 61.25 MHz (NTSC, channel 3).
- Where necessary, measure the waveforms and voltages with (⊤) and without (⊤̸) aerial signal. Measure the voltages in the power supply section both in normal operation (①) and in standby (⏻). These values are indicated by means of the appropriate symbols.
- The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.

- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. ‘Dolby’, ‘Pro Logic’ and the ‘double-D symbol’, are trademarks of Dolby Laboratories.

DOLBY SURROUND
PRO • LOGIC

Figure 2-2 Dolby PL Symbol

3. Directions for Use

English

Cinema Link

Cinema Link is a new Philips feature in which the TV, the audio receiver and other video peripherals like DVD player and video recorder communicate with each other (on condition they all are equipped with the Cinema Link functionality and are connected via a eurocable). They automatically offer the highest quality combination of picture and multi channel surround sound to create your own Home Cinema.

With one key on the remote control, with which you can control all Cinema Link products, your total Cinema Link system will be started and the DVD or video recorder will start to play and the audio receiver will provide the sound (on the condition Cinema link is enabled) on behalf of the TV.
The TV can function as the centre speaker of your system, making a separate centre speaker unnecessary.
By pressing the standby key ⏻ on the remote control for at least 3 seconds, the complete Cinema Link system will be switched to standby.

Note: The Cinema Link functionality is only available with devices of the Cinema Link (P50.3) generation !
(Digital A/V-Receiver FR996;
Video recorder VR820;
DVD-player DVD952 and their successors.)

Configuration of the Cinema Link peripherals

The connection diagram in the inside cover shows you how to connect the Cinema Link peripherals with each other.
Notes:

- *Besides to the TV at least one peripheral should be provided with the Cinema Link functionality to take profit from this feature.*
- *To take advantage of the highest quality of multi channel Surround sound it is advisable you have a Cinema Link audio receiver connected.*
- *The peripherals connected don't need to see the TV remote control in the Cinema Link system. The commands given to the TV are automatically passed to the other peripherals. This allows you to put the peripherals behind the doors of a cabinet or to place them in another room.*
- *To enjoy Digital Surround playback, the digital device (e.g. DVD) should be connected to the digital input of the audio receiver ④ with a separate cinch audio cable.*
- *The optional wireless speakers of the TV cannot be used.*

Preparation and Operation

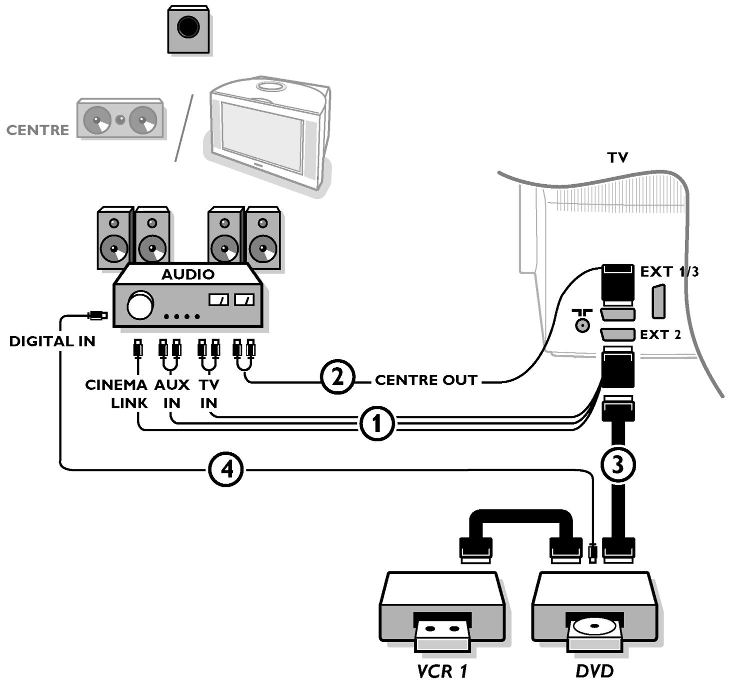
❶ Cinema Link is switched on as soon as the audio receiver and the TV are switched on. If necessary, Cinema Link may be switched off or on again only on the audio receiver. See the instructions for use of your audio receiver.
Important: When Cinema Link is switched on all audio commands control the audio receiver instead of the TV.

❷ The message **CINEMALINK ON** is displayed on the audio receiver and on the TV. Now the CinemaLink system is activated.
Note: it is recommended to disable CinemaLink when the receiver is used to record a CD e.g. or when using a headphone when others are watching TV.

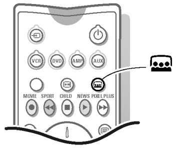
Now you can adjust the initial TV settings for optimal surround sound and install the audio channels before starting up one of the CinemaLink devices. The system information about country choice, menu language and picture format you set up during the installation of the TV is transferred to the audio receiver automatically.

TV as centre speaker

See the Instructions for Use of the TV, Setup, Source menu, Centre input, p. 19.
Use the test tone functin in the Speakers menu to have a reference of the loudness of the separate speakers.
Note: If you want the loudspeakers of your TV to act as centre speaker, also connect a cinch to scart cable (not supplied) ②.



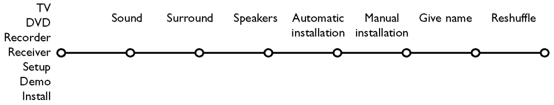
Activating CinemaLink



Press the Cinema Go -key on the remote control.

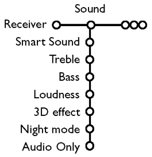
1. The TV sends a play command to the Cinema Link DVD player, if present.
2. The DVD player will start playing and the audio receiver automatically switches to the best Cinema Link sound.
3. If no DVD player is connected or if the DVD player has no disc loaded, the command can not be executed.
4. The TV will then send a play command to the Cinema Link video recorder, if present.
5. The video recorder will start playing and the audio receiver select the best Cinema Link sound.
6. If no video recorder source is connected or tape is loaded, the TV will select the last watched TV channel.

Receiver menu


TV
DVD
Recorder
Receiver
Setup
Demo
Install
Sound
Surround
Speakers
Automatic installation
Manual installation
Give name
Reshuffle

Note: When Cinema Link is enabled, certain items of the Sound menu (see TV menu) are steered by the audio receiver instead of by the TV.

1. Press the **MENU** key on the remote control.
2. Press the cursor down to select **Receiver**.
3. Press the cursor right to enter the Receiver menu items.
4. Press the cursor up/down to select the submenu items.
Note: the audio receiver submenu items may only be selected if provided by the audio receiver (dependent on the configuration setup and the sound signals transmitted).


Sound
Receiver
Smart Sound
Treble
Bass
Loudness
3D effect
Night mode
Audio Only

Sound menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu items.

Smart Sound, Treble, Bass

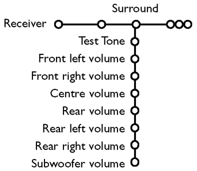
See the Instructions for Use for the TV.

Loudness

When **Loudness On** is selected and when listening at low volume, the low and high frequencies are amplified so that the natural balance is restored.

3D effect

3D effect enables you to experience the effect of Dolby Surround Pro Logic without the need of having rear speakers connected or activated.
elect the level of 3D effect with the cursor left/right.


Surround
Receiver
Test Tone
Front left volume
Front right volume
Centre volume
Rear volume
Rear left volume
Rear right volume
Subwoofer volume

Night mode *(only functional with Dolby Digital sound broadcasting input)*
The loud parts of the sound are lowered and the soft passages are raised. You can enjoy surround sound without disturbing sleeping children or neighbours.

Audio only

This control enables you to blank the TV picture if the TV is used as centre speaker in the Cinema Link system and if the audio receiver is reproducing sound unrelated to a TV picture.
Switch **Audio only On** to only hear the sound and to switch off the picture.
The message **Audio only** appears on screen.

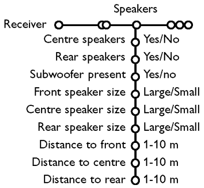
Surround menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu items.

Adjustment of the volume level of the loudspeakers

Note: the test tone function is automatically cancelled by the audio receiver when leaving the Surround menu.

1. Select **Test Tone On**.
A steady noise tone is switched sequentially through the available loudspeakers, except for the subwoofer, for 2 seconds each. This enables you to have a reference of the loudness of each loudspeaker and to adjust the level of each until they all sound equally loud.
The loudspeakers activated light up in the screen graphic.
2. Select the Surround menu items with the cursor up/down one after another and alter the selected adjustments with the cursor left/right.
The best result is achieved when all speakers have equal volume in your usual listening position.
3. Select **Test tone Off** when you have finished the adjustment of the speaker levels.


Speakers
Receiver
Centre speakers Yes/No
Rear speakers Yes/No
Subwoofer present Yes/no
Front speaker size Large/Small
Centre speaker size Large/Small
Rear speaker size Large/Small
Distance to front 1-10 m
Distance to centre 1-10 m
Distance to rear 1-10 m

Speakers menu

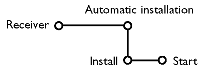
Dependent on the audio receiver speakers configuration, you may not be able to select certain menu items.
Once the number and position of the loudspeakers has been fixed, selecting Centre speaker, Rear Speakers and Subwoofer Yes or No, you can adjust the initial receiver settings, size and distance, for optimal surround sound.
Note: after changing the configuration, the menu will disappear temporarily and re-appear again after the new stettings will be updated.

Size of the speakers

Select **Small** if your speaker is able to reproduce low notes down to at least 80-100 Hz. Select **Large** if your speaker is able to reproduce low notes down to at least 50 Hz.
Note:
- *As a rule of thumb, a large speaker has a cone diameter of at least 12 cms (5 inches). See the specification sheet of your loudspeakers.*
- *If Subwoofer present is set to **No**, Front speaker size can only be set to Large. If Front speaker size is set to **Small**, Centre speaker size can only be set to Small and consequently a subwoofer must be connected.*

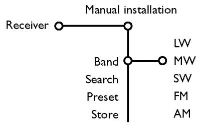
Distance to the speakers

Select the distance from your usual listening position to the available speakers each; front, centre and rear speakers. This defines the delay time for the surround sound.



Automatic installation

In the Automatic installation menu select Start to activate the automatic searching of all radio stations which can be received.
The programme list is automatically filled with all the numbers and names of the radio stations transmitted.



Manual installation

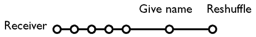
You can also search for a known radio station by keying in the frequency.

❶ Firs select **Band** to switch to the desired waveband: **LW**, **MW**, **SW**, **FM** or **AM**.

❷ Select **Search** and press the cursor right.
The frequency increases until a radio station is found.
If you know the 3-digit frequency, enter it directly with the digit keys 0 to 9.
Select **Preset** to enter the preset number using a three digit entry with the digit keys.

❸ To store your radio station, select **Store** and press the **OK** key.

❹ Repeat steps ❶ to ❸ to store another radio station.



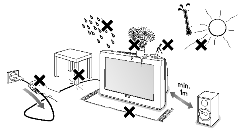
Give name - Reshuffle

To assign or change a name to a radio station or to change the order of the stored radio stations according to your preference, act in the same way as with giving a name or reshuffling the programme list of TV stations.
See the Instructions for Use of the TV.

Exceptions: The menu language is always English (the selected menu language with the TV has no influence) and the selection item ***SPECIAL*** *on the keyboard is not available.*

Preparation

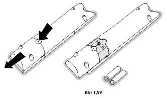
❶ **Place the TV on a solid surface.**
! 28PW9527: 41 kg; 32PW9527: 59 kg; 36PW9527: 79 kg !



For ventilation, leave at least 5 cm free all around the TV.
Do not place the TV on a carpet.
To prevent any unsafe situations, do not place any objects on top of the TV. Avoid heat, direct sunlight and exposure to rain or water. Keep mobile telephones at a safe distance to avoid disturbances in picture and sound.

❷ Insert the aerial plug firmly into the aerial socket ⊤ at the back of the TV. For best picture quality use the suppressor-aerial cable supplied.

❸ Remote control: Remove the cover of the battery compartment.
Insert the 2 batteries supplied (Type R6-1,5V).



The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries exhausted batteries may not be disposed of with your household waste. Please check on how to dispose of exhausted batteries according to local regulations.

Note: this remote control functions with TVs and other equipment which use the RC6 signalling standard.

❹ **Insert the mains plug of the TV** in the wall socket having a mains voltage of 220V-240V.
To prevent damaging the mains (AC) cord which could cause a fire or electric shock, do not place the TV on the cord.

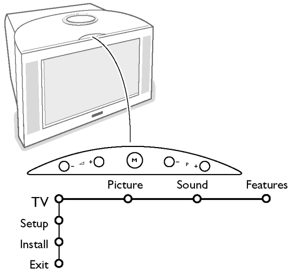
❺ **Switch the TV on** : Press the power switch ⏻ on the front of your TV.
A green indicator on the front of the TV lights up and the screen comes on.
If the indicator is red, press the **-P+** keys on the remote control.

The green lamp blinks every time you press a key on the remote control.
When you switch on your set for the first time, the menu ***LANGUAGE*** *automatically appears on the screen. The explanation appears in different languages one at a time. Choose your own language and press the OK key on the remote control.*

Optional wireless transmitter module

Your TV has been prepared and equipped to connect a wireless transmitter module with an integrated cable and wireless surround sound loudspeakers. Such a kit may be purchased at your TV retailer. (Type no: AD902W).
Select the correct type of transmitter in the Setup menu, Speakers, Wireless transmitter, p. 9 Default 864 MHz has been selected at the factory.
How to connect and to operate, see the appendix to this manual, p. 23.

Keys on top of the TV



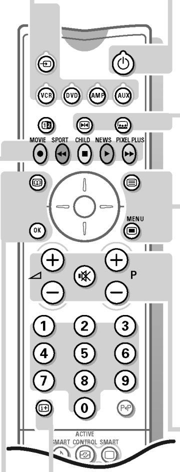
Should your remote be lost or broken you can still change some of the basic settings with the keys on top of your TV.

- Press the ◿ - or + key to adjust the volume.
- Press the **P** - and + key to browse through the TV channels or sources stored and to select them.
- Press the **M** key to summon the main menu.
Use the ◿ - and + keys to select the menu items in the horizontal axis.
Use the **P** - and + keys to select submenu items in the vertical axis.
Use the **M** key to confirm your selection.

Note:
- Sometimes not all the menu items are visible on the screen; Press the ***P +*** *key to reveal all items.*
- ***Exit*** *lets you dismiss the menu. Select* ***Exit*** *and press the* ***M*** *key.*

Use of the remote control

Use the on-screen info for more information about the different keys. See p. 5



Select peripherals
Press this key to select **EXT1**, **EXT2**, **EXT3** or **SIDE**, according to where you connected the peripherals (p. 21).

VCR DVD AMP AUX (see p. 21)
Press one of these keys to use the remote control directly in the video recorder, DVD, amplifier or other auxiliary mode (CD, SAT).
A green indicator lights up.
Press the key again to return to TV mode.

● ◀◀ ■ ▶ ▶▶ **Video recorder** see p. 21

Select TV channels by theme
If NEXTVIEW with defined themes is broadcast, it is possible to quickly select TV programmes with the coloured keys.

① Press the red, green, yellow or blue key to select one of the four predefined theme categories **MOVIES**, **SPORTS**, **CHILDREN**, **NEWS**.
The TV switches to the first TV channel broadcasting a programme of the selected theme. At the same time a list of all the TV channels currently transmitting a programme of the selected theme appears on the screen.
② Use the cursor up/down to select a programme.
③ Press the same colour key again to remove the list. (After 10 seconds the list is removed automatically.)

PIXEL PLUS **Switching Pixel Plus demo on/off**

① Press the **PIXEL PLUS** key.
The TV screen is divided into 2 parts:
- in the left part Pixel Plus and Digital Natural Motion switched off;
- in the right part Pixel Plus and Digital Natural Motion switched on.

② Press the **PIXEL PLUS** key again to switch the Pixel Plus demo off.

NEXTVIEW see p. 15
Press this key to activate NEXTVIEW/Teletext Guide. Press again to select Picture/NEXTVIEW or Teletext Guide in dual screen format. Press once again to display a full screen picture.

OK Press this key to activate your choice, when in the menus.

⏻ **Standby**
Press to switch the TV on or off.
When switched off, a red indicator (orange when acquiring NEXTVIEW information) lights up. When acquiring NEXTVIEW the TV is switched to full standby after a period of max. 1 hour and the red indicator lights up.
If your EasyLink video recorder has the system standby function and you press the standby key for 3 seconds, both the TV and video recorder are switched to standby.

Freeze
To activate/de-activate the frozen picture and to hold a teletext page.

Cinema Go
See separate Cinema Link instruction manual supplied.

Teletext see p. 17
Press this key to activate Teletext.
Press again to select Picture/NEXTVIEW or Teletext Guide in dual screen format. Press once again to display a full screen picture.

Main menu on/off see p. 6

◿ Press + or - to adjust the volume.

🔇 Interrupt the sound or restore it.

P Programme selection
To browse through the TV channels and sources stored.
Only those channels which are in the favourite list can be selected with the **-P+** keys.

0/9 Digit keys
To select a TV channel.
For a two digit programme number, enter the second digit within 2 seconds.
To switch immediately to a selected one digit TV channel, keep the digit key pressed a bit longer.

Screen information
Press to display information about the selected TV channel and programme.

Menu information
When the menu is on screen, press to display info on the selected menu item. While the menu info is displayed, press any key to display remote control info.

Dual screen

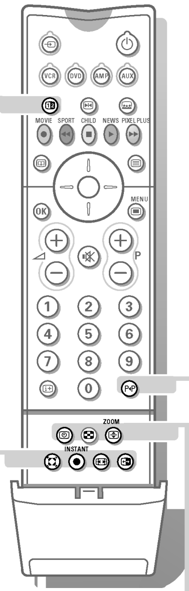
① Press the key to switch on Dual screen.
The TV screen is divided into 2 parts: the left side for the normal main picture, the right side for teletext broadcast by the selected TV channel or for NEXTVIEW.
To operate NEXTVIEW, see p. 15.
To operate teletext, see p. 17.
② Press the key under the door of the remote control to select a vertical squeezed or a non vertical squeezed picture size.
③ Move the puck to the blue ball in the left screen. Press **+ P -** to select another TV channel.
④ Press the key or the key to switch off dual screen.

Surround mode
Press this key repeatedly to select another available surround mode: Stereo, Dolby 3 Stereo, 3D Surround, Hall or Dolby Pro Logic.

● **Instant record**
If your video recorder has the EasyLink function, the **INSTANT** ● key for record can be operated in the TV mode.

Picture format
Press this key to summon a list of **available** picture formats.
Press this key repeatedly or press the cursor up/down to select another picture format: Auto format, Super zoom, 4:3, Movie Expand 14:9, Movie Expand 16:9, Subtitle zoom, Wide screen.
Auto format makes the picture fill the screen as much as possible.
In case of subtitles in the bottom black bar, Auto format makes the subtitles visible. In case of a broadcaster logo in the corner of the top black bar, the logo disappears from the screen.
Super zoom removes the black bars on the sides of 4:3 programs with minimal distortion.
When in Movie Expand 14:9, 16:9 or Super zoom picture format, you can make subtitles visible with the cursor up/down.

no function



P<P **Smart surf**
With this feature you can easily switch between up to 9 different TV channels/sources.
In the menu system, you can set Smart surf to 2- or 9-programme.
(See General, Smart surf, p. 10.)
Press this key to select the previously viewed TV channel or source in case of a 2 programme surf.
In case of a 9 programme surf, a list appears at the right side of the screen. On top, the most recent programme is displayed. The puck is on the channel number currently viewed.
Press the P<P key to turn to the next channel in the list or press cursor up/down to immediately select the desired TV channel of the list.

To add a new channel or source: tune to the channel or source you wish to add.
Press the P<P key. Press the cursor right to add.
If there are already nine channels/sources in the list, the one at the bottom of the list will be removed.

To remove a channel or source: select the channel number you want to remove.
Press the P<P key. Press the cursor right to remove.
Press the **OK** key or wait for the time out to dismiss the Smart surf display.

Time display: The time is displayed on the screen.

no function

ZOOM on/off
Press the **ZOOM** key to activate/deactivate the zoom function.
Press the **OK** key repeatedly to select one of the zoom magnifications (x1, x4, x9, x16). Use the cursor up/down, left/right to shift the selected zoom window over the screen with the cursor.
The zoom window is reset after: selecting another TV channel, another picture format or when another picture format is selected automatically.

Active control

Active control is a pro-active and automatic system. The TV continuously measures and corrects all incoming signals in order to provide the best picture possible. Thanks to the Ambient Light Sensor which measures the light conditions of the room, the contrast, dynamic contrast, brightness and colour picture settings are adjusted automatically. The light sensor is active when the Active control function is switched to Medium or Maximum. Press the key repeatedly to select the Active Control values Off, Minimum, Medium or Maximum (recommended).

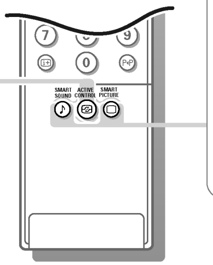
Off Sharpness and Dynamic Contrast are controlled automatically

Minimum Sharpness, Dynamic Contrast and Noise Reduction are controlled automatically.

Medium Dynamic Contrast, Colour, Sharpness and Noise reduction are controlled automatically.

Maximum Contrast, Dynamic Contrast, Colour, Sharpness and Noise reduction are controlled automatically.

Press the cursor right to select **INFO+**.
The Active Control demo menu appears.
The picture settings are being adapted continuously and automatically.
The menu items cannot be selected.
The sliders will be moving, showing how the TV is tweaking the current picture. None of the sliders is user controllable.
Press the **OK** key to switch off the Demo.



Smart Keys

To select predefined picture and sound settings.

♪ Smart Sound

Each time it is pressed, a different sound setting is selected, corresponding with specific factory settings of treble and bass.

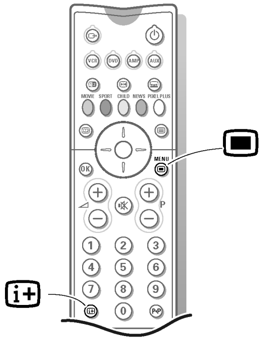
☐ Smart Picture

Each time it is pressed, a different picture setting is selected, corresponding with specific factory settings of Contrast, Colour, Sharpness, Dynamic Contrast and Colour enhancement.

Personal refers to the personal preference settings of picture and sound selected in the picture and sound menu.

Remark: the moment you are in a predefined smart sound or picture setting and you modify a setting in the picture or sound menu, all values of the menu will overwrite the previously made Personal settings. The predefined factory settings remain unchanged.

Menu Info / Remote Control Info



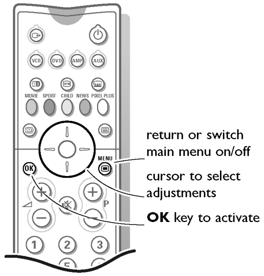
Menu Info

① Press the **MENU** ▣ key and select a menu item or submenu item.
② Press the i+ key on the remote control to get information about the selected menu item.
③ Press the i+ key again to exit.

Remote Control Info

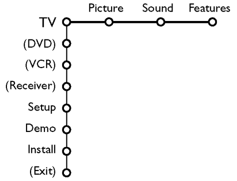
① Press the **MENU** ▣ key.
② Press the i+ key.
③ Press any key on the remote control (except the cursor keys, the OK, the **MENU** ▣, the digit, the i+ and the ⏻ keys) and you get information about the pressed key.
The normal function of the key is not executed.
The moment one of the remote control keys which do not invoke remote control info, is pressed, remote info is cancelled.
④ Press the i+ key to display the menu that was on screen before a remote control key for info was pressed.

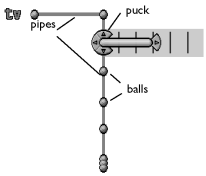
To use the menus and the menu system

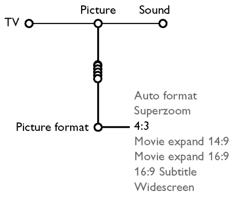

return or switch main menu on/off
cursor to select adjustments
OK key to activate

Attention: point the remote control to the indicator of the TV.

① Press the **MENU** ▣ key on the remote control to summon the main menu. Which items appear in the main menu depends on the peripherals connected. In case of an Cinema Link VCR or DVD, the menu items **VCR** and **DVD** are present, see p. 21.
In case of a Cinema Link audio receiver or DVD, the menu item **Receiver** or **DVD** is present. See the separate Cinema Link booklet supplied.
*Note: The Main menu only contains the item **Exit** to dismiss the menu, when you switch on your TV for the first time, or when the Main menu is summoned with the **M** key on top of the TV.*
② Use the cursor in the up/down direction to select the **TV**, **(DVD)**, **(VCR)**, **(Receiver)**, **Setup**, **Demo** or **Install** menu.
Note: Sometimes not all the menu items are visible on the screen. Press the cursor down to reveal all items.
③ Use the cursor in the left/right direction to select the menu item.
④ Use the cursor up/down again to select the control you want to select or to adjust.
⑤ Press the **MENU** ▣ key again to turn off the main menu.







The menu system

Pipes, balls and a puck

The hierarchy of menus and controls is represented by an animated visual mechanism of pipes, balls and a puck. The animated mechanism constantly shows the current whereabouts and continually expands the view of the immediate neighbourhood.

The puck surrounds the ball indicating the user's current position in the menu hierarchy.
The puck is always present when the menu system is displayed.
The puck is divided into 4 parts. They correspond to the directional controls (up/down, left/right) on the remote control. The arrows on the cursor indicate which directions to choose.
In this way users can navigate through the menu hierarchy to the control they wish to adjust.

When items are more numerous than can fit comfortably on the TV display, only a portion are shown. Those omitted are indicated by a cluster of balls which indicates that there are 'more' items.

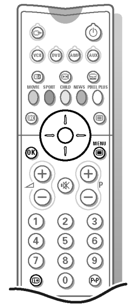
Direct selection and control

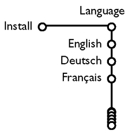
Menu items are controlled as soon as they are selected by the puck. Only a few items require confirmation with the **OK** key.

List controls

A list control is used to select one or more items from a list of options.
For instance, the Picture format option list with 4:3, Movie Expand 14:9, etc.
Press the right key to move the puck into the list. At least one item is the current value and is highlighted.
Moving the puck up or down with the up/down key causes the list to move down or up.

Select the menu language





① Press the **MENU** key on the remote control.

When you switch on your TV for the first time and no channels are stored so far, the menu Language automatically appears on the screen. This menu also has an additional item ***exit*** *with which the menu can be dismissed. The explanation appears in different languages, one at a time. Choose your preferred language and press the* ***OK*** *key on the remote control. Proceed with the Install menu.*

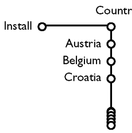
② Use the cursor down to select **Install**.

③ Use the cursor right to select **Language**.
Follow the instructions on screen.

④ Use the cursor up/down to select your preferred language and press the **OK** key to confirm your selection.

⑤ Proceed with the **Install** menu.

Select the country

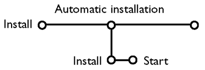


① Use the cursor right to select **Country**.

② Select the country where you are now located and press the **OK** key.
Select **Other** when none of the countries applies.

③ Proceed with the **Install** menu.

Store TV channels



You can now search for and store the TV channels in two different ways: using Automatic Installation or Manual Installation (tuning-in channel by channel).
Select your choice with the cursor right.

After the new or extra TV channels have been stored, the TV automatically transfers those TV channels to the video recorder if it is equipped with the EasyLink function. The message EasyLink: downloading ...... appears on the screen. The programme list of the video recorder is now the same as the one of the TV.

Automatic installation

① Select **Automatic installation** in the Install menu.
Note: All channels must be unlocked in order to autoprogram. If requested, enter your PIN to unlock all channels. (See TV, Features menu, Childlock, p. 14.)

② Press the cursor down.
The autoprogramming option label **Start** appears.

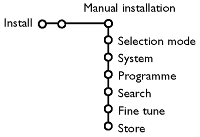
③ Press the cursor right.

④ The message **Searching** appears and the progress of autoprogramming is displayed.
When the Automatic installation is complete, the puck navigates to Install again.

If a cable system or a TV channel which broadcasts ACI (Automatic Channel Installation) is detected, the search is stopped and the programme list appears.
Without ACI broadcast, the channels are numbered according your language and country selection. You can use Reshuffle to renumber them. See p. 8

It is possible that the cable company or the TV channel displays a broadcast selection menu. Layout and items are defined by the cable company or the TV channel. Make your choice with the cursor and press the ***OK*** *key.*

Manual installation



Manual installation

Searching for and storing TV channels is done channel by channel. You **must go through every step** of the Manual Installation menu.

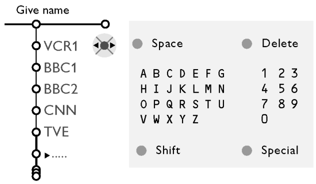
① Select **Manual installation** in the Install menu.

② Press the cursor down.
Follow the instructions on screen.

Note: Search or direct selection of a TV channel
If you know the frequency, the C- or S-channel number, enter the 3 digits of the frequency directly with the digit keys 0 to 9 (e.g. 048). Press the cursor down to proceed.

Repeat to search for another TV channel.

Give name



It is possible to change the name stored in the memory or to assign a name to a TV channel for which a name has not yet been entered. A name with up to 5 letters or numbers can be given to the programme numbers 0 to 99. For example SUPER, BBC1,... Before programme number 0 you can also enter a name for the peripherals that are connected to a euroconnector.

① Select **Give Name** in the Install menu and press the cursor down.

② Select the programme number.
Note: keep the cursor up/down pressed to scroll through the programme list and to avoid that the TV tunes to each channel passed by.

③ Press the cursor right.
A keyboard appears on the screen.
Press the cursor right to enter the keyboard.
Press the cursor up/down, left/right to select the first character and press **OK**. Repeat for every character you want to enter.
Select **Space** to enter a space; **Delete** to erase the highlighted character in the name entered; **Shift** to display upper- or undercast characters on the keyboard; **Special** to display special characters on the keyboard. Press **OK** to confirm.

④ Press the cursor left repeatedly when you have finished the name giving of the selected channel or peripheral.

⑤ Select another programme number and repeat steps ③ to ⑤.

Reshuffle the programme list

According to your preference you **can** change the order of the stored TV channels.

① Select **Reshuffle** in the **INSTALLATION** menu and press the **OK** key.

② Follow the instructions on screen.

Select Favourite TV channels

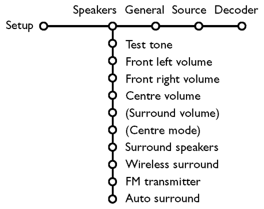
① Select **Favourite programmes** in the **Install** menu.

② Select your programme number with the cursor up/down.

③ Select **Yes** or **No** with the cursor right.

④ Repeat ② and ③ for every TV channel or external you want to make a favourite or a non-favourite TV channel or external.

Install TV Setup



Speakers

Availability of Speaker menu items

	Stereo	3 Stereo	3D Surround	Hall	Pro Logic
Test tone	•	•	•	•	•
Front left volume	•	•	•	•	•
Front right volume	•	•	•	•	•
Centre volume		•	•		•
Surround volume				•	•
Centre mode	•	•	•	•	•
Surround speakers				•	•

Test tone and Volume controls

The menu item **Test tone** enables you to adjust the volume level of each until they are balanced.
The speakers activated light up in the screen graphic.

1. Select **Test tone**.
2. Press the cursor right.
3. Select **On** or **Off** with the cursor up/down.
Once turned on, the Test Tone will circulate through the Left, Centre, Right and both Rear surround speakers (if present).
4. Press the cursor left.
5. Press the cursor up/down to select the desired speaker for individual volume level adjustment.
6. Press the cursor left/right to adjust the volume level.
7. Continue and select the other speakers for adjustment as desired.
8. Press the cursor up to return to the **Test Tone** menu item when speaker adjustments are complete and turn the control **Off**.

Centre Mode

See Connect Peripheral Equipment, External Speakers, Amplifier, p. 20.

The Setup menu contains items that control the settings of the TV's functions, features, services and peripherals you may have connected.

The **Speakers** menu reflects the speaker-related controls.
The **General** menu allows you to change settings that will typically be accessed only occasionally.
The **Source** menu allows you to select a source and/or to name each input source.

In order to receive the full reproduction capability of true Dolby Surround Sound you should include the proper use and arrangement of the speakers:
- via the TV and its internal Front right, Centre and Left speakers and two amplified rear surround speakers connected to the back of the TV;
- or via the Variable Line Out connectors and an external Dolby amplifier. See External speakers/Amplifier, p. 20.

Select the various Speakers menu controls to setup the configuration of the TV's speakers system for Dolby audio playback.
Each volume control can be adjusted to match test tone levels.
Depending on the output and Surround mode (see Main menu, TV, Surround, Sound mode, p. 13) selected, some menu items may be greyed out and are not selectable.

If no External Front Speakers are connected, do not change the predefined factory settings which is **Centre mode No**. If an external amplifier with Front Speakers is connected, select **Centre mode Yes**.
In this setting, the centre channel in surround mode is directed to all three internal TV speakers (left, centre and right).

Surround Speakers

See Connect Peripheral Equipment, External Speakers, p. 19. If no Surround Speakers are connected do not change the predefined factory settings which is **No**.
If Surround Speakers are connected select **Yes**.
(Dolby Pro Logic and Hall are not available if **No** is selected.)

Wireless Surround

Only operational when you connected a special wireless transmitter module and wireless surround sound loudspeakers. (Kit with type no. AD902W).
See: Optional Wireless Surround speaker system, p. 23.

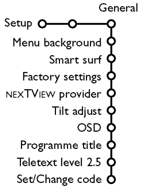
FM transmitter

Select the correct type of transmitter, when connected at the rear of the TV. See Optional Wireless surround speaker system, p. 23.

Auto Surround

Sometimes the broadcaster transmits special signals for Surround Sound encoded programmes.
The TV automatically switches to the best surround sound mode when **Auto Surround** is switched **On**.
However it is possible to overwrite this setting.

General



Menu background

1. Select **Menu background**.
2. Press the cursor right.
3. Select **Yes** or **No** to turn the Menu background on or off.

Smart surf

1. Select **Smart surf**.
2. Select **2 programmes** or **9 programmes** with the cursor left/right.
Select **2 programmes** if you want the P◂P key to toggle between the current and the previously selected channel.
Select **9 programmes** if you want the P◂P key to summon a list of up to 9 channels which can be selected. (See Use of the Remote Control, p. 3.)

Factory settings

This function allows you to reset most of the picture and sound settings to their predefined factory values.

1. Select **Factory settings**.
2. Press **OK** to erase settings and reset them to their default values.

NEXTVIEW provider

Most broadcasters in Europe are offering teletext pages containing the day's programme schedule. These pages can be requested by switching the TV to Teletext Guide.
Some broadcasters are offering an extended programme guide service called NEXTVIEW.
NEXTVIEW is a new way of presenting programme schedules and offers more features than basic teletext. With NEXTVIEW it is possible to show for instance all the movies or children programmes for today or the following days.

If you select **None** as NEXTVIEW provider, the TV will capture data from the available TV channels if they broadcast NEXTVIEW. Broadcaster defined menus will not be available.
If you select a programme number of a TV channel broadcasting NEXTVIEW, the selected TV channel will provide NEXTVIEW data and additional information of its own broadcasts as well as from other (non selected) TV channels.
Normally you will select the NEXTVIEW provider that transmits most information in your language. You can make the best selection via information from TV announcements or from the newspapers.

Important:
In order for NEXTVIEW to function properly, the first TV channel from the favourite list should also broadcast the correct local date and time via teletext. Please check at startup if the time and date are correct in the NEXTVIEW screen.

Remark:
Only some TV broadcasters support NEXTVIEW.
How to make use of NEXTVIEW, see p. 15.

Tilt adjust

Select **Tilt adjust**.
Keep the cursor left/right pressed to adjust the rotation of the picture.

OSD (On Screen Display)

1. Select **OSD**.
2. Press the cursor right to select **Normal** or **Minimum**.
Normal to activate the continuous display of the programme number and extended display of TV channel and programme information on screen. **Minimum** to activate the display of reduced channel information.
See Use of the Remote Control, p. 3, [i+] On screen information.
Note: When Subtitles is switched on, see Features, p. 15, continuous display of the programme number is not possible.

Programme title

1. Select **Programme title**.
2. Press the cursor right to select **Programme title Yes** or **No**.
When selected **Yes**, after the selection of a TV programme or after pressing the [i+] key on the remote control, a TV channel which broadcasts teletext may transmit the name of the TV channel or the programme title. When selected **No**, the programme title will only appear after pressing the [i+] key, and not after the selection of a TV channel.

Teletext level 2.5

Some broadcasters offer the opportunity to see more colours, other background colours and nicer pictures in the teletext pages.

1. Select **Teletext level 2.5**.
2. Press the cursor right to select **Teletext level 2.5 On** to take advantage of this feature.
3. Press the cursor right again to select **Teletext level 2.5 Off** if you like the more neutral teletext layout.
The selection made is valid for all channels which broadcast teletext.
Note: It may take a few seconds before teletext broadcast switches over to Teletext level 2.5.

Set/Change code

The Child lock feature (see TV, Features, p. 14) allows you to lock channels to prevent children from watching certain programmes. To watch locked channels, you need to enter an access code.
The **Set/Change code** menu item allows you to create or change a Personal Identification Number (PIN).

① Select **Set/Change code**.

② If no code exists yet, the menu item is set to **Set code**.
If a code has previously been entered, the menu item is set to **Change code**. Follow the instructions on screen.
All number combinations from 0000 to 9999 are valid numbers.

③ The **General** menu reappears with a message confirming that the code has been created.

Important: You have forgotten your code !

① Select **Set/Change code** in the General menu.

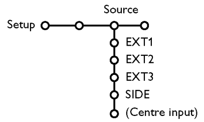
② Press **OK**.

③ Press the cursor right.

④ Enter the overriding code 8-8-8-8.

⑤ Press the cursor again and enter a new personal 4-digit code. The previous code is erased and the new code is stored.

Source



This menu allows you to select the peripheral you connected to one of the external inputs.

① Select **Source**.

② Press the cursor down to select one of the external inputs.

③ Press the cursor right to enter the list of names of peripherals attached to the selected input.

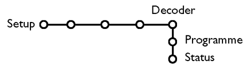
④ Select the peripheral device with the cursor up/down.

Once you have selected the source, e.g. VCR, this source will automatically be selected when your remote control is in VCR mode, see p. 3, and when you press the ⊕ key on the remote control.

Centre input

When you have connected a Cinema Link surround receiver to the TV (See separate Cinema Link instruction manual supplied) and you have selected one of the external inputs as centre input, the loudspeakers of the TV will act as centre speaker, making a separate centre speaker unnecessary.

Decoder



If a decoder or a descrambler is connected, see p. 19, you can define one or more programme numbers as decoder programme numbers.

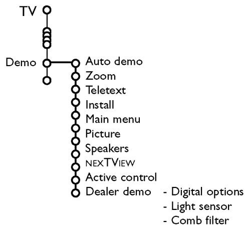
① Select **Decoder** with the cursor right.

② Select **Programme**.

③ Select the programme number under which you have stored the programme coming from your decoder.

④ Select **Status**.
- Select the input used to connect your decoder: **None**, **EXT1** or **EXT2**.
- Select **None** if you do not want the selected programme number being activated as a decoder programme number.

Demo



The Demo menu allows to demonstrate the TV features separately or in a continuous loop.

① Select **Demo** in the Main menu.

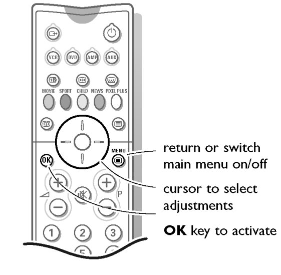
② Select **Auto demo** or one of the features with the cursor right and press the **OK** key on the remote control.

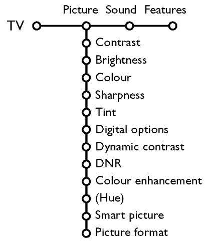
If **Auto demo** has been selected the demo will automatically present all the features sequentially in a loop. Press one of the cursor keys to stop the Auto demo.
If one of the features has been selected, this particular feature demo will run only once, and the Demo menu will disappear.

Select Digital options, Light sensor and Comb filter On or Off

Select one of the Digital options, Lightsensor and Comb filter On or Off to really see the difference in picture quality.
In Dealer demo mode it is possible to change channels with **-P+** and to adjust the volume.
Note: The Dealer demo is not part of the automatic sequence and can only be activated separately.

TV menu


MENU
OK
P
return or switch main menu on/off
cursor to select adjustments
OK key to activate



Press the **MENU** ▣ key on the remote control to summon the main menu.
Use the on-screen Menu-Info, see p. 5, for more information about the menu items.

Note: When the main menu is accessed from the keypad on top of the TV, it has an additional Exit item, which lets you dismiss the menu.

Picture menu

Press the cursor right to select **Picture**.
Select the menu items in the Picture menu with the cursor up/down. Adjust the settings with the cursor left/right or enter the list of submenu items with the cursor right. Select a submenu item with the cursor up/down.
Note: To remove the menu background before adjusting the picture settings, see Select TV setup, General, p. 10.

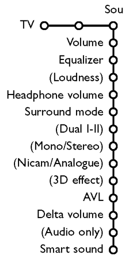
Digital options

Although Pixel Plus is the most ideal setting, it may be preferable, dependent on your own preference, to select Double lines, or 100 Hz Digital Scan.
- **100 Hz Dig. Scan** = 100 Hz + Dig. Scan (Field and line flicker reduction) without motion compensation.
- **Pixel Plus** = creates near High Definition performance inside the TV on the basis of a regular input signal.
The number of lines are increased and the number of pixels on a line are doubled in combination with Digital Natural Motion. As such Pixel Plus enhances both regular broadcast signals and DVD or Digital TV input towards unparalleled sharpness and depth, near High Definition and natural detail.
- **Double Lines** = provides for a doubling of vertical and horizontal resolution which adds astonishing sharpness and a total absence of visible picture lines. Motion compensation reduces jitter and offers smooth, yet sharp motion reproduction.
Advised for NTSC (60 Hz) pictures.

Note:
- *Pixel Plus is not active when Teletext (Except when Subtitling is activated), NEXTVIEW or Teletext Dual screen is selected.*
- *When having selected Pixel Plus, the size of the menus on screen is reduced. This is a normal behaviour.*
- *Interference, caused by fluorescent lights just above the TV, may occur when having selected Pixel Plus.*

The modified adjustments for Contrast, Brightness, Colour, Sharpness, Colour enhancement, Tint, Digital options and Dynamic Contrast are automatically stored.
Select Factory settings in the Setup menu, General, to restore the predefined factory settings, see p. 10.

Sound menu



Press the cursor right to select **Sound**.
Select the menu items in the Sound menu with the cursor up/down and adjust the settings with the cursor left/right.
Remember, control settings are at normal mid-range levels when the bar scale is centred.

Note:
- *Some menu items are only available in case of a Cinema Link configuration and when the Cinema Link is activated. Others are steered by the audio receiver instead of by the TV. See the separate Cinema Link booklet supplied.*
- *Dual I-II is only available with dual sound transmission.*
- *Mono/Stereo is only selectable in case of analogue stereo transmission.*
- *Nicam/Analogue is only selectable in case of Nicam transmission.*
- *Surround modes can not be modified when a headphone has been connected and the mode is always stereo.*

Surround Modes

Dependent on the sound signal broadcasted, select one of the Surround modes.

Stereo

This mode reproduces only the left and right front sound signals.
You only hear a stereo sound if the broadcast which you are receiving is transmitted in stereo or nicam stereo.

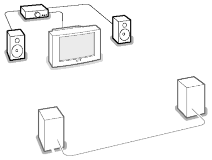
Dolby 3 Stereo *(optimal with Dolby Surround broadcasting)*

The sound signal is now distributed over the front left, the front right and the centre TV loudspeakers.
The rear loudspeakers do not produce any signal.

3D Surround *(optimal with Dolby Surround broadcasting)*

3D Surround enables you to experience the effect of Dolby Surround Pro Logic * without the need of having rear speakers connected or activated.
The graphical representation of the rear loudspeakers is replaced by the symbol))) (((.
Select the level of **3D effect** with the cursor left/right.

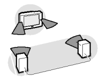
With two extra front loudspeakers connected



To enhance the sound reproduction of your TV you may connect two extra front loudspeakers via an external amplifier. See Connect Peripheral Equipment, Extra loudspeakers/Amplifier, p. 20.
In the Surround modes **+ ext. amp** is added to indicate that you should switch on your amplifier as in these modes the internal TV speakers produce only centre sound. The subwoofer speaker is muted.

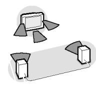
Note: If extra front speakers are connected and selected, all internal TV speakers produce centre sound in the surround modes Pro Logic, Dolby 3 Stereo and 3D Surround.

Hall



The special sound signal is distributed over the rear loudspeakers which creates a hall effect from the rear.
The centre loudspeaker does not reproduce any signal.
This mode is recommended when you wish to add surround sound to a broadcast which is not encoded Dolby Surround or to a mono signal.

Pro Logic *(with Dolby Surround broadcasting)*



In addition to the left and right internal speakers, the centre and the rear surround loudspeakers reproduce the Dolby Surround Pro Logic sounds.
This sound is always present in the movie or programme marked with DD Dolby Surround. This mode is especially recommended for such programmes or movies.
Dolby Pro Logic signals are also present on some DVD tracks.
Note: Normal stereo broadcast is not always encoded to produce a rear surround sound.

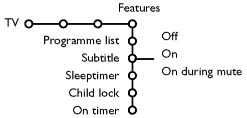
Note: In case of a Cinema Link configuration connected, the surround modes of the receiver can be selected.

Pro Logic and Hall can only be reproduced if Surround speakers is set to Yes in the Setup, Speakers menu, p. 9, and rear speakers are connected.

* ‘Dolby’ ‘Pro Logic’ and the double-D symbol DD are trademarks of Dolby Laboratories Licensing Corporation. Manufactured under license from Dolby Laboratories Licensing Corporation.

Features menu

Press the cursor right to select **Features**.



Select the menu items in the Features menu with the cursor up/down and adjust the settings with the cursor left/right.
Use the on-screen Menu-Info [i+] for more information about the menu items.

Programme list

Press the **OK** key to switch over to the selected TV channel or external.

Select subtitles

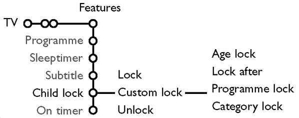
Switch on teletext and select the proper subtitle page from the index.
Switch off teletext.
Now the subtitle page is stored for the selected TV channel.

Once subtitles have been stored and **Subtitle On** has been selected they will automatically be displayed on the selected TV channels if subtitles are in the transmission.
A symbol will indicate that the mode is on.

Select **On during mute** when you want to have the subtitles automatically displayed when the sound has been muted with the 🔇 key on the remote control.

Child lock

1. Select **Child lock**.



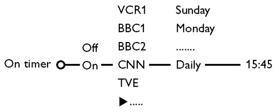
2. Press the cursor right to enter the Child lock menu.
You're summoned to enter your code. Enter the access code.
Note: You have to re-enter your code each time you enter the child lock menu.

Important: You have forgotten your code ! See p. 11.

3. Select one of the menu items of the child lock menu.
   - Select **Lock** if you want to lock all channels and externals.
   - Select **Custom lock** and press the cursor right.
   The items Age lock and Category lock are available when NEXTVIEW broadcast is available.
     - Select **Age lock** if you want to lock programmes related to a certain age: off, 2, 4 ... 18.
     - Select **Programme lock** if you want to lock the programmes from a certain TV channel or external.
     - Select **Category lock** if you want to lock programmes related to a certain theme: Movies, Sports, Shows.... See NEXTVIEW, p. 15.
     - Select **Lock after** if you want to lock all programmes from a certain time onwards.
     Press the cursor right and enter the time with the cursor up/down and right. Press the **OK** key to validate.
     Note: The entered time will remain valid for every day, until you have selected Unlock.
   - Select **Unlock** to unlock all locked channels and externals at once.

On timer

1. Select **On timer**.



2. Select **On** with the cursor right.
3. Press the cursor right again to enter the programme list.
4. Select the TV channel or external you want your TV to switch to on a selected time and day.
5. Press the cursor right again to select a day of the week or to select **Daily**.
6. Press the cursor right once again to enter the time.
7. Enter the time with the digit keys or with the cursor up/down.
8. Press the **OK** key to activate.
9. Press the **MENU** ▤ key to turn off the menu.

Note: To check your timer settings, press the [i+] key.

NEXTVIEW / Teletext guide

NEXTVIEW is an electronic guide that allows you to look up programmes as you would in a newspaper or a TV magazine. You can sort the programmes by subject (films, sport...), obtain detailed information and programme your video recorder if it comes with the NEXTVIEWLink function.

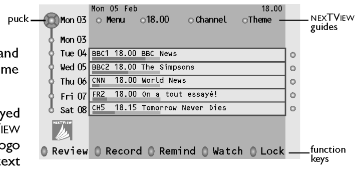
Important note: ***The NEXTVIEW service is only available on certain programmes and in certain countries.*** *When no NEXTVIEW information is broadcast, the teletext programme guide appears in its place. this is based on teletext programme information (if available) and offers most functions of NEXTVIEW.*
Note: The broadcaster is responsible for the content of the information. The TV is responsible for the capture of that information and for the presentation to the user.

Display of a NEXTVIEW page

The information is set by the channel that transmits the NEXTVIEW service.
For example:

Programme name and broadcast time

This logo is only displayed during a NEXTVIEW transmission. No logo indicates it is a teletext programme guide


puck
Mon 05 Feb
Mon 03
Menu
18.00
Channel
Theme
18.00
NEXTVIEW guides
Mon 03
Tue 04
Wed 05
Thu 06
Fri 07
Sat 08
BBC1 18.00 BBC News
BBC2 18.00 The Simpsons
CNN 18.00 World News
FR2 18.00 On a tout essayé!
CH5 18.15 Tomorrow Never Dies
Review
Record
Remind
Watch
Lock
function keys

NEXTVIEW guides:
- choice of the day
- channel choice
- sort by subject
- programme preview

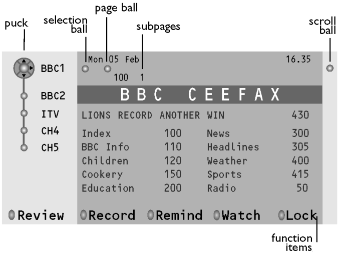
NEXTVIEW functions:
Use the coloured keys on the remote control to activate them.
The text appears in grey when the function is not available.

Using NEXTVIEW / Teletext guide

Call Teletext/NEXTVIEW guide

Press the ▣ key on the remote control to call the Teletext/NEXTVIEW guide. A menu appears with the message **One moment please**.
After a while you obtain:
- a NEXTVIEW page, if the selected channel broadcasts this service (the NEXTVIEW logo is displayed. See also Setup menu, General, NEXTVIEW provider, p. 10),
- a teletext page, if the selected channel does not broadcast NEXTVIEW,
- **No information available** is displayed if neither NEXTVIEW nor teletext are transmitted. In this case, select another channel.
  Note: Press the ▣ key twice to exit NEXTVIEW/Teletext Guide.

Teletext Guide


puck
selection ball
page ball
subpages
scroll ball
BBC1
BBC2
ITV
CH4
CH5
Mon 05 Feb
100 1
16.35
B B C   C E E F A X
LIONS RECORD ANOTHER WIN 430
Index 100
BBC Info 110
Children 120
Cookery 150
Education 200
News 300
Headlines 305
Weather 400
Sports 415
Radio 50
Review
Record
Remind
Watch
Lock
function items

① When in Teletext Guide mode, select a TV channel with the cursor up/down and press **OK**.

② Move the cursor up to the top of the channel list where the name of the selected TV channel reappears.

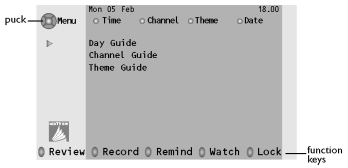
③ In the Teletext index page, look for the programme guide page of the day or the following day.

④ Enter with the digit keys, the programme guide page number.

⑤ Press the cursor right to move the puck over the selection ball.

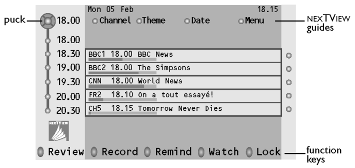
⑥ Use the cursor up/down to scroll through the different programmes.
- If the selected programme contains a page number with an optional subcode referring to a page with more info about the programme, press the **OK** key to display the information. Press the **OK** key again to return to the programme guide page.
- If the selected programme guide page satisfies the VPT requirements,
  - it will be possible to record, remind, watch or lock programmes:
  - the TV will remember the last selected teletext page number of that channel that contains programme guide information and indicates which programme starts at what time.
    Every time you press the ▣ key, the teletext programme guide page of the selected TV channel will be available.

NEXTVIEW


puck
Menu
Mon 05 Feb
18.00
Time
Channel
Theme
Date
Day Guide
Channel Guide
Theme Guide
Review
Record
Remind
Watch
Lock
function keys

If in the Setup menu, General, see p. 10, you have selected a TV channel as NEXTVIEW provider and the selected channel broadcasts this service, the NEXTVIEW menu appears when NEXTVIEW is switched on. In other cases, NEXTVIEW starts up with the **Time Guide**.

① Use the cursor key left/right to select **Time**, **Channel**, **Theme**, the date (or the menu).
The **Time guide** provides an overview of all programme titles active in the selected time block.
The **Channel guide** provides an overview of all programmes that are broadcast by a single channel during one day.
With the **Date guide** you can choose a specific date.
The **Theme guide** displays a list of all programmes at the selected date, that matches with the selected category.


puck
18.00
Mon 05 Feb
18.15
Channel
Theme
Date
Menu
NEXTVIEW guides
18.00
18.30
19.00
19.30
20.00
20.30
BBC1 18.00 BBC News
BBC2 18.00 The Simpsons
CNN 18.00 World News
FR2 18.10 On a tout essayé!
CH5 18.15 Tomorrow Never Dies
Review
Record
Remind
Watch
Lock
function keys

Going through the menu guide, the TV is collecting the sorting criteria to finally display a list of programme events.

② Press the **OK** key to select the guide type.

③ Move the puck down and to the right to select the programmes.
If available a summary or commentary on the programme is displayed at the bottom of the screen.

④ Use the cursor up/down to scroll through the programmes.

⑤ Press one of the colour keys to select one of the basic functions (if available): **review**, **record**, **remind**, **watch**, **lock**..

Basic functions

Press one of the grey, red, green, yellow or blue keys to activate a Teletext Guide, **NEXTVIEW** function.
The keys appear in grey if the function is not available.

Review *(not available in Teletext Guide)*: this menu provides a list of programmes that are marked as reminders, those that have to be recorded and those that are locked. This menu can be used to change a reminder of programmes to be recorded.
Record: to programme the recording of the video recorder (if it has a NEXTVIEWLink function and is connected to **EXTERNAL 2**).
Remind: automatically switch on the TV if it is in standby or stops a programme from being broadcast by displaying a message if the TV is on.
Lock: to lock certain programmes to prevent recording or watching.

For the functions Record, Remind or Lock, a small menu pops up in which you can choose the interval: **once**, **daily** or **weekly**, or clear an earlier made record, remind or lock setting. The default interval is sit to **Once**. to confirm the frequency, press the **OK** key.

Note: For certain broadcasts, the Series option is suggested. With this option, the system will independently search for when the next episode in the series is being broadcast.

Watch: to watch the selected and currently broadcast programme. *(Not available in Teletext guide)*.

Select Picture/NEXTVIEW Guide

Press the ▣ key twice.
The screen is divided into two parts: the left side for the normal main picture, the right side for NEXTVIEW/Teletext Guide/
Press the ⓬ or ▣ key to return to a full picture screen.
Note:
- in half screen mode the basic functions of the NEXTVIEW/ Teletext Guide are limited to Record, Remind and Watch.
- when using the ⓬ key the TV will display the last used of teletext or NEXTVIEW.

Acquisition and updating of NEXTVIEW information

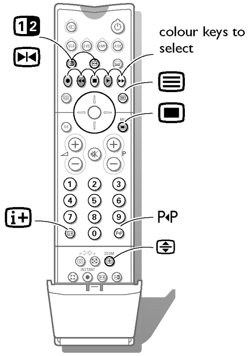
Acquisition and updating of NEXTVIEW is done when you are watching the TV channel of the selected NEXTVIEW provider, see Setup menu, p. 10, or when the TV is switched to standby;
The indicator on the front of the TV remains orange during standby. After all needed acquisition or updating is complete, it turns red.
Acquisition of fresh date will happen once during the night.
Note: it may be necessary to put the TV in standby mode when all NEXTVIEW information is outdated, e.g. returning from holiday.

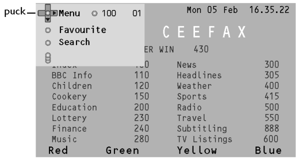
Teletext

Most TV channels broadcast information via teletext. This TV has a 1200 pages memory that will store most broadcasted pages and subpages to reduce waiting time. After each programme change, the memory is refreshed. It may take some time for all pages to load.
Depending on the TV channel, teletext is transmitted in different systems. The colours used in the bottom line of the teletext page correspond with the colour keys of your remote control.

Switch Teletext on and off

Press ▤ to switch the teletext on.
Press again to display a picture/teletext screen.
Press once again to return to a full screen picture.





The main index page appears on the screen together with an information line at the top, an option line at the bottom and a puck in the top left corner of the screen.

Select a Teletext page

With the digit keys

Enter the desired page number with the digit keys.
The page counter seeks the page or the page appears immediately when the page number has been stored in the memory.
A message appears when you have entered a non existent or incorrect page number. Page numbers beginning with 0 or 9 do not exist. Choose another number.

With the option line

Select with the colour keys, corresponding to the coloured options at the bottom of the screen, the desired subject.

Select Picture/Teletext

Select a TV channel which broadcasts teletext.
Press the 12 or the ▤ key twice.
The screen is divided into two parts: the left side for the normal main picture, the right side for teletext broadcast by the selected TV channel.
Press the ▤ or 12 key to return to a full screen picture.
Note: when using the 12 key, the TV will display the last use of teletext or NEXTVIEW.

Quickly run through the teletext pages

Press the cursor up/down or the **- P +** key to run through the previous or the following pages.

Select the previously selected teletext page

Press the P◁P key.
Note: Only possible when teletext pages are active, not when the Teletext menu is displayed.

Select the index teletext page

Press the grey colour key ▶▶ to display the main index (usually p.100).

Only for T.O.P teletext broadcasts :

T.O.P orders the pages in categories and adds other possibilities of enhancing ease of use.
Press i+. A T.O.P. overview of the teletext subjects available is displayed.
Not all TV channels broadcast T.O.P. teletext. When the teletext system is not T.O.P. teletext, a message appears at the bottom of the screen.
Select with the cursor up/down, left/right the desired subject and press the **OK** key.

Select subpages

When a selected teletext page consists of different subpages, one of the subpages appears on the screen.
Press the cursor right to highlight the subpagenumber.
Press the cursor up/down to select the next or previous subpage or enter the subpagenumber with the digit keys.

Special teletext functions

Hold

Press ⧓ to stop the automatically rotating of the subpages or to stop the page counter from seeking when you have entered a wrong page number or when the page is not available. Enter another page number.

Enlarge

Press ⇳ repeatedly to display the upper part, the lower part and then to return to the normal page size. When the upper part is displayed, you can scroll the text, line by line using the cursor up/down.

Hypertext

With hypertext you can select and search for pages containing any word or number on the current teletext page.

❶ Make sure you are not in the teletext menu and that the puck is in the upper left corner of the screen.

❷ Press the cursor key down to highlight the first word or a number on the page.

❸ Use the cursor up/down, left/right to select the word or number you want to search for.

❹ Press the **OK** key to confirm.
A message appears at the bottom of the screen to indicate that the searching is going on or that the word or page is not found.

Teletext menu *(only available in full screen teletext mode)*

❶ Press the ▣ menu key to activate the menu.

❷ Press the cursor up/down to select the menu items.

Favourite

This list contains up to eight favourite teletext pages.
Only the pages of the current channel can be selected.

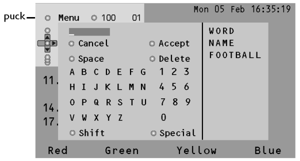
❶ Press the cursor right to add the current page or to select one of the favourite pages to the list.

❷ Press the **OK** key or the cursor right again to add.

❸ Press the cursor left to return to the Teletext menu.

Search

On the keyboard on screen you can type in a word you want to search for in the teletext pages. Whether upper- or lowercase is used has no influence. Searching for numbers is not possible.



❶ Press the cursor left/right, up/down to select the characters, words or functions.

❷ Press the **OK** key to confirm each character selected.

❸ Select **Cancel** to cancel the word or character selected.
Select **Space** to enter a space; **Delete** to delete the last character selected; **Shift** to switch between undercast or capital characters; **Special** to display special characters on the keyboard.

❹ Press the cursor left repeatedly to return to the Teletext menu again.

Searching a word

❶ Type in the word on screen or select a word from the history list on the right and press **OK**.

❷ Select **Accept** and press **OK** again.
The message **Searching** appears. When the word is found, it is highlighted in the teletext page.

❸ To continue the search, press the **OK** key twice.
When a word is not found, a message appears.

❹ To search for a new word, select **Keyboard** and press **OK**.

❺ Select the new word.

Reveal

Reveals/conceals hidden information on a page, such as solutions to riddles and puzzles. Press the **OK** key to activate.
Press **OK** again to return to the Teletext menu.

Cycle subpages

Makes the subpages cycle automatically. Press the **OK** key to activate and to de-activate again.

Timed page

To display a specific page at a certain time.

❶ Press the cursor right to select **Yes** or **No.**

❷ Enter the time and pagenumber with the cursor keys or the digit keys.
Note: Teletext does not have to remain switched on. It is not possible to display a timed page when the TV is switched to standby.

Language

If the displayed characters on screen do not correspond with the characters used by the teletext broadcaster, you can change the language group here.
Select **Group 1** or **Group 2** with the cursor keys left/right.

Press the **MENU** ▣ key to leave the Teletext menu.

Select Continuous Subtitles

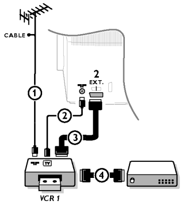
TV channels with teletext often transmit programmes with subtitling. For each TV channel you can store a subtitle page.

Switch on teletext and select the proper subtitle page from the index.
Switch off teletext.
Now the subtitle page is stored for the selected TV channel.

Connect Peripheral Equipment

There is a wide range of audio and video equipment that can be connected to your TV.
The following connection diagrams show you how to connect them.

Recorder



Connect the aerial cables ①, ② and, to obtain the optimum picture quality, eurocable ③ as shown.
If your recorder is provided with the EasyLink function, the eurocable supplied with it should be connected to EXTERNAL 2 to benefit from the EasyLink functionality.

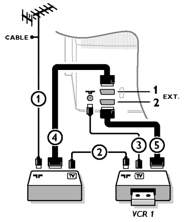
If the eurocable ③ is not used the following steps are required:

Search for and store the test signal of the recorder

❶ Unplug the aerial cable ① from the aerial socket ┳ of your recorder.
❷ Switch on your TV and put the recorder on the test signal. (See the handbook for your recorder.)
❸ Search for the test signal of your recorder in the same way as you searched for and stored the TV signals. See Installation, Store TV channels, Manual Installation, p. 8.
❹ Store the test signal under programme number 0 or between 90 and 99.
❺ Replace the aerial cable in the aerial socket ┳ of your recorder after you have stored the test signal.

Decoder and Recorder
Connect a eurocable ④ to your decoder and to the special euroconnector of your recorder. See also the recorder handbook. See Decoder, p.11.
You can also connect your decoder directly to **EXTERNAL 1** or **2** with a eurocable.

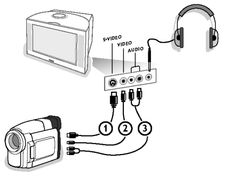
Other equipment (except Digital Sources)



❶ Connect the aerial cables ①, ② and ③ as shown. Better picture quality can be obtained if you also connect eurocable ⑤ to **EXTERNAL 2** and a eurocable ④ to **EXTERNAL 1** or 3.
❷ Look for the test signal of your peripheral in the same way as you do for a Recorder.
*When a recorder is connected to **EXTERNAL 1** you can only record a programme from your TV. Only when a recorder is connected to **EXTERNAL 2** it is possible to record a programme from your TV as well as from other connected equipment. See Record with your recorder, p. 22.*

*Note: **EXTERNAL 1** can handle CVBS and RGB, **EXTERNAL 2** CVBS and Y/C, **EXTERNAL 3** CVBS and RGB. It is preferred to connect peripherals with RGB output to **EXTERNAL 1** or **3** as RGB provides a better picture quality.*

Side connections



Camera or Camcorder

❶ Connect your camera or camcorder to sockets at the right side of your TV.
❷ Connect the equipment to **VIDEO** ② and **AUDIO L** ③ for mono equipment.
❸ For stereo equipment also connect **AUDIO R** ③.

S-VHS quality with an S-VHS camcorder is obtained by connecting the S-VHS cables with the **S-VIDEO** input ① and **AUDIO** inputs ③.

Do not connect cable ① and ② at the same time. This may cause picture distortion !

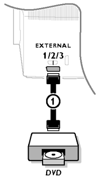
Headphone

❶ Insert the plug into the headphone socket 🎧 at the right side of the TV.
❷ Press 🔇 on the remote control to switch off the internal loudspeakers of the TV.
The headphone impedance must be between 8 and 4000 Ohm. The headphone socket has a 3.5 mm jack.

In the **SOUND** menu select **Headphone volume** to adjust the headphone volume.

Note: The surround mode is always stereo when the headphone is connected.

Digital equipment

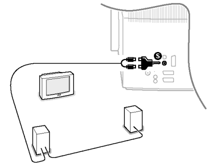


Connect your digital equipment with a eurocable ① to one of the euroconnectors (**EXT1**, **EXT2** or **EXT3**), or with a cinch cable to the **VIDEO** input at the right side of the TV.

Note: the low quality of some digital picture material may be the cause of digital image distortion. In this case select Eco under the smart picture ▢ key on the remote control as this setting is intended to improve distorted picture quality.

Connect extra loudspeakers/amplifier

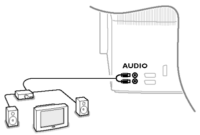
REAR multimedia loudspeakers



You can enjoy Dolby Pro Logic Surround sound by connecting two rear loudspeakers to be connected to the Dolby Surround output **S** at the back of your TV.

❶ Connect two rear loudspeakers with built in amplifiers or an audio amplifier with rear loudspeakers.
Connect the audio cables to the rear loudspeakers and to the Dolby surround output **S** at the back of your TV as shown above. There is only one output for both speakers.
Note: Switch off the TV and the rear loudspeakers before connecting them.
*The surround output **S** has a 3,5 mm jack.*
❷ Select **Surround speakers Yes** in the Setup menu. See p. 9.
See Surround sound modes in the Sound menu, p. 13 for the available Surround modes.
Rear Surround Sound loudspeakers should always be located behind or to either side of the listener at about 1 m above the listener.
❸ Adjust the volume of the rear loudspeakers.
Use the Test tone function in the Speakers menu, see p. 9, to have a reference of the loudness of the separate loudspeakers.
Note: Once you have adjusted the volume of the rear loudspeakers, do not change it while watching TV as the whole configuration operates with the volume adjustment of your TV.

Stereo amplifier and two extra FRONT speakers



To enhance the sound reproduction of your TV you can connect two extra front loudspeakers via an external amplifier.

❶ Connect the audio cables to the audio input of your amplifier and to **AUDIO L** and **R** at the back of your TV.
The output level is controlled by the volume control of your TV.
Note: Switch off the TV and your audio amplifier before connecting them. Set the audio amplifier's volume to minimum.
❷ Select **Centre mode On** in the Setup, Speakers menu. See p. 9. See Surround mode in the Sound menu, p. 13 for the available Surround modes.
❸ Adjust the volume of the audio amplifier.
Use the Test tone function in the Setup, Speakers menu, see p. 9 to have a reference of the loudness of the separate loudspeakers.
Note: Once you have adjusted the volume of the amplifier, do not change it while watching TV as the whole configuration operates with the volume adjustment of your TV.

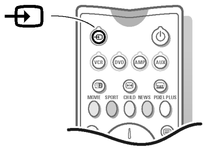
If extra front speakers are connected and selected, all internal TV speakers produce centre sound in the surround modes Dolby Pro Logic and Dolby 3 Stereo.

Cinema Link Surround receiver

❶ Connect the Dolby Pro Logic Surround amplifier to the **AUDIO L** and **R** at the back of your TV.
❷ If you want the loudspeakers of your TV to act as centre speaker, also connect a cinch to scart cable (not supplied) to the multichannel Surround receiver and to **EXT1** or **EXT3** at the back of your TV.
❸ Select **Centre mode On** in the Setup, Speakers menu, p. 9.
The loudspeakers of the TV will now produce centre sound, the loudspeakers connected to the audio receiver will produce Surround sound.
❹ Switch off the volume of the TV with the mute key 🔇.
All volume settings, tone control and speaker connections have to be done via the external Dolby Pro Logic amplifier.
Attention: the sound info on screen will not correspond with the actual sound reproduction.
No sound will be heard when a TV channel or external source is blocked via the Child lock menu, see p. 14.

If you want to connect more equipment to your TV, consult your dealer.

To select connected equipment



Equipment connected with an aerial cable only :
Select the programme number under which you have stored the test signal with the digit keys.

Equipment connected to a euroconnector or to the right side of the TV

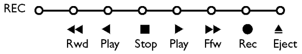
1. Press the ⊕ key repeatedly to select **EXT1**, **EXT2**, **EXT3** or **SIDE** according to where you connected your equipment at the back or the right side of your TV.
   Remark : Most equipment (decoder, Recorder) carries out the switching itself.
2. Press the cursor up/down and press **OK**.

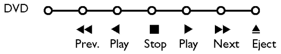
If you want to change to TV channels?
Enter the programme number of the TV channel which you want to watch with the digit keys.

Recorder or DVD with EasyLink

The recorder or DVD can be operated via the **VCR** or **DVD** menu on screen.

1. Press the **MENU** ▤ key on the remote control.
2. Select the Recorder or DVD menu with the cursor up/down.

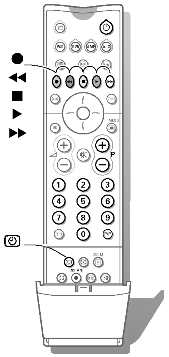




3. Press the cursor left/right, up/down to select one of the Recorder or DVD functions.

*The key **INSTANT** ● for recording, under the door of the remote control, can be operated in the TV mode.*
If your EasyLink Recorder has the system standby function, when you press the ⏻ key for 3 seconds, both TV and the Recorder are switched to standby.

Audio- and video equipment keys



Most of the audio and video equipment from our range of products can be operated with the remote control of your TV.

Press one of the keys after you pressed the **VCR**, **DVD**, **AMP** or **AUX** key according to the equipment you want to operate with this remote control. See Use of the remote control, p. 3.

⏻	to switch to standby (**VCR**)
⏯	for pause (**DVD, CD**)
●	for record,
◀◀	for rewind (**VCR, CD**); search down (**DVD, AMP**)
■	for stop,
▶	for play,
▶▶	for fast forward (**VCR, CD**); search up (**DVD/AMP**)
▭	to select your choice of subtitle language (**DVD**); RDS news/TA (**AMP**); to shuffle play (**CD**)
▤	to select a **DVD** title; RDS display (**AMP**); info on screen (**CD**)

ⓘ	display information
▤	to switch the menu on or off
- P +	for chapter, channel, track selection
0 to 9	digit entry,
P◂P	tape index (**VCR**), select a DVD chapter, select a frequency (**AMP**)
⊙	VCR timer
⛶	surround on/off (**AMP, CD**)
cursor up/down	to select the next or the previous disc (**CD**)
cursor left/right	to select the previous or following track (**CD**)

Note: If no action has been taken within 30 seconds, the remote control goes back to the TV mode.

AUX keys
The **AUX** mode can be customised according to the equipment you want to operate: a CD player, a satellite receiver with RC5 signalling standard or a satellite receiver with RC6 or RC5 signalling standard.

Press the **OK** key together
with the digit key 1 to select the CD system,
with the digit key 2 to select the **SAT RC-5** system,
with the digit key 3 to select the **SAT RC-6** system.

Record with your Recorder without EasyLink

To record S-VHS quality, connect an S-VHS peripheral directly to the recorder.

Record a TV programme

1. Select the programme number on your Recorder.
2. Set your Recorder to record.
   See the handbook for your Recorder.

Switching programme numbers on your TV does not disturb recording !

Record a programme on your Recorder connected to EXTERNAL 2 from Audio/Video equipment connected to EXTERNAL 1, EXTERNAL 3 or to sockets on the right side of the TV

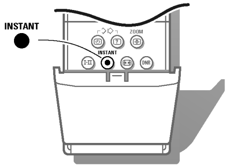
1. Switch on the equipment.
2. Select the correct external on your recorder.
3. Set your Recorder to record.
   You record what you are watching on the screen.

Do not switch programme numbers or do not switch off your TV when you are recording !

Record with your Recorder with EasyLink

If you have connected an S-VHS Recorder provided with the EasyLink function, you can record S-VHS quality from an S-VHS peripheral connected to the right side of the TV. (E.g. from an S-VHS camcorder.)

In TV mode, it is possible to start a direct recording of the programme which is being displayed on the TV screen.
*Press the **INSTANT** ● record key, under the door of the remote control.*



The Recorder switches on from standby and a message of what is being recorded appears on the screen.
The Recorder starts recording the programme you are watching. Switching programme numbers on your TV does not disturb recording !

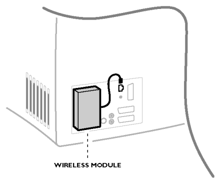
When recording a programme from a peripheral connected to EXTERNAL 1, 3 or SIDE, you can not select another TV programme on the screen.
To watch TV programmes again, press the programme number you want to select twice.
Attention: the recording is stopped and your Recorder switches to standby.

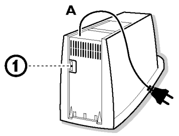
If you switch to standby during recording of a programme from a peripheral connected to EXTERNAL 1, 3 or SIDE, the blinking lamp on the front of your TV indicates that you are still recording. The blinking stops after the recording is finished.

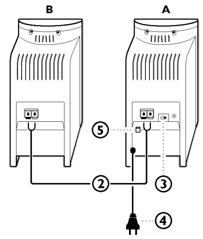
Record with your Recorder with NEXTVIEWLink

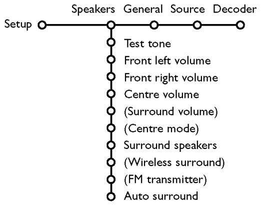
If your Recorder is equipped with NEXTVIEWLink, and you tagged one or more programmes to be recorded automatically in the NEXTVIEW mode, it is not necessary for the TV to be in the standby mode or switched on for the recording to start.

Appendix: Optional Wireless Surround speaker system - Kit type no: AD902W









Wireless transmitter module

- Switch the TV off with the power switch.
- Attach the wireless module to the back of the TV as shown.
- Connect the attached cable to the wireless module connector.
- Switch the TV on.

Surround loudspeakers

There are two surround loudspeakers supplied. One is the active loudspeaker A. The other loudspeaker B is a passive one which has to be connected with the active loudspeaker.

- The slide channel switch ① at the bottom of the active loudspeaker has been set default to channel 1 in the factory.
- Connect the active to the passive loudspeaker with the supplied speaker cable ②. Insert the marked wire into the openings of the same coloured connector clips on both speakers. Do not insert the wires too far.
- The Surround sound loudspeakers can be located behind or to either side of the listener. The front of the loudspeakers do not have to face the listener. The distance between the TV and the surround speakers should not exceed 15 m. *Note: In rare occasions people moving around close to the TV may interfere with the sound transmission.*
- Set the position switch ③ to the right if the active loudspeaker is positioned to the right side of the listener, to the left if it is positioned to the left side of the listener (seen from the point of view of watching the TV).
- Connect the active loudspeaker to the mains with the mains cable ④.
- Switch on the active loudspeaker with the **POWER** switch ⑤.
  The red indicator at the front of the active surround speaker shows that the speaker is in standby. During sound transmission the indicator turns to green. 10-15 min. after the sound transmission of the TV has stopped, the indicator turns back to red to indicate the low power standby.
  To switch the active speaker off, use the **POWER** switch.

Setup - Speakers menu

- Press the **MENU** ▣ key on the remote control.
- Use the cursor down to select **Setup**.
- Use the cursor right to select **Speakers**.
- Use the cursor down to select **Wireless surround**.
  The system has already been configured in the factory to work properly. In rare circumstances, interference from external RF (wireless) equipments such as RF headphones, mobile phones or remote controls for lights, may occur. Then it may be necessary to shift to another wireless channel.
  Important: Always be sure that the active surround speaker (A) and the Wireless surround setting are switched to the same transmitting channel. Otherwise no sound or only a distorted sound will be heard on the surround speakers.
- Select **FM transmitter** and select the correct type of transmitter, 864 MHz or 433 MHz, valid for the country where you are now located.
  When the TV is tuned to a channel in the neighbourhood of 864 MHz (alternatively 433 MHz), the transmitter is switched off because no RF surround sound is possible. this is necessary to avoid interfered picture.

In rare cases, when no RF surround sound is possible or when there is too much interference, use the wired back up solution with a 3.5 mm stereo jack. In this case select Off in the Wireless surround menu item. See Connect Peripheral Equipment, p. 20.

Tips

Care of the screen
Clean the TV with a slightly damp soft cloth. Do not use abrasive solvent as it can damage the TV screen.

Mobile telephone warning !
To avoid disturbances in picture and sound, malfunctioning of your TV or even damage to the TV, keep away your mobile telephone from the TV.

Poor Picture

- Have you selected the correct TV system?
- Is your TV or house aerial located too close to loudspeakers, non-earthed audio equipment or neon lights, etc.?
- Mountains or high buildings can cause double pictures or ghost images. Sometimes you can improve the picture quality by changing the direction of the aerial.
- Is the picture or teletext unrecognisable? Check if you have entered the correct frequency. See Installation, p. 8.
- Are brightness, sharpness and contrast out of adjustment? Select Factory settings in the Setup menu, p. 10.
- Sometimes poor picture quality is possible when having activated an S-VHS camera or camcorder connected to the right side of your TV and another peripheral is connected to **EXT1**, **EXT2** or **EXT3** at the same time. In this case switch off one of the other peripherals.

No picture

- Is the aerial connected properly?
- Are the plugs tightly connected in the aerial socket?
- Is the aerial cable in good condition and does it have suitable plugs?
- Are the connection facilities to a possible second TV in good condition? If in doubt, consult your dealer.

No sound

- No sound on any channel? Check the volume isn't at minimum.
- Is the sound interrupted with the mute key 🔇? Check if your speaker configuration corresponds with the selections made in the Setup menu, Speakers, p. 9. E.g. is your amplifier switched on when you have 2 extra front speakers connected?
- No sound from the rear speakers or the centre speakers? Select an appropriate surround mode, according to the broadcasted sound signal or adjust the volume or check if the wireless transmitter is properly connected. See Surround Modes, p. 13.

No Surround sound

- Check if the headphone is not plugged in.
- Check if the channel is broadcasting good quality surround.

Remote control

- If your TV no longer responds to the remote control, the batteries may be dead or the wrong mode (TV or other peripheral, see p. 3) is selected.
- You can still use the **M** key and the -/+ keys at the top of your TV.

Menu
Have you selected the wrong menu? Press the **MENU** key again to exit from the menu.

NEXTVIEW - No information
See Acquisition and updating of NEXTVIEW information, p. 16.

NEXTVIEW - Displayed time is wrong
The broadcaster on programme number one does not transmit the correct local date and time. Use **Reshuffle** in the **INSTALLATION** menu to place another broadcaster on programme number one.

Wireless Surround speaker system

- Are the active surround speaker and the Surround Sound setting in the Setup menu switched to the same transmitting channel?
- External RF equipment, mobile telephones or people moving around close to the TV may disturb the sound transmission.
- When no RF surround sound is possible, or when there is too much interference, try to switch to another wireless channel or use the wired back up solution. See Install Sound Setup, p. 9.
- When you switch to another wireless channel, take care to select the same transmitting channel as well in the setup menu as on the speaker box.
- For wireless transmitter modules with a built in antenna: direct the antenna to achieve the best reception.

No solution
Switch your TV off and then on again once.
Never attempt to repair a defective TV yourself.
Check with your dealer or call a TV technician.

End of life directives
Philips is paying a lot of attention to producing environmentally-friendly in green focal areas. Your new TV contains materials which can be recycled and reused. At the end of its life specialised companies can dismantle the discarded TV to concentrate the reusable materials and to minimise the amount of materials to be disposed of.
Please ensure you dispose of your old TV according to local regulations.

How to dispose of dead batteries?
The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries dead batteries may not be disposed of with your household waste. Please ensure you dispose of dead batteries according to local regulations.

4. Mechanical Instructions

Index of this chapter:
1. Service connector
2. Set Disassembly
3. Service Positions
4. Assy / Board Removal
5. Set Reassembly

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Service Connector (for ComPair)

For service diagnostics with ComPair, it is not necessary to disassemble the set. You only have to connect the ComPair interface box, via the appropriate cable, to the service connector (on the rear of the set, see figure below), and start the program (see also chapter 5).

4.2 Set Disassembly

Follow the disassemble instructions in described order.

4.2.1 Wireless Surround Transmitter Removal (if attached)

1. Remove the cable of the Wireless Surround Transmitter box (at the right side of this RJ45 plug you can find the release-hook of the lock-mechanism).
2. Pull the Wireless Surround Transmitter box backwards. It is clicked to the rear cover via three clamps.

4.2.2 Rear Cover Removal

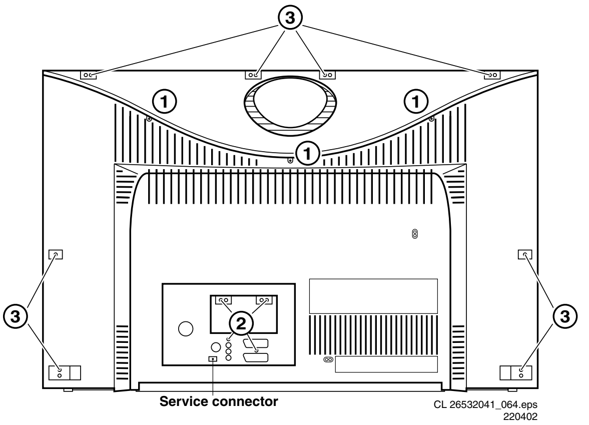


Figure 4-1 Rear view

Warning: disconnect the mains power cord before you remove the rear cover.

First, remove the top cover (= plate with 'saucer'):
1. Remove the three fixation screws [1] that hold the cover plate.
2. Pull the cover (horizontally) backwards.

To be able to access the electronics of the set, you must remove the rear cover:
1. Remove the fixation screws [2] of the rear I/O cover plate.
2. Remove the remaining fixation screws [3] at the two sides, and the top of the rear cover.
3. Now remove the rear cover. Make sure that wires and cables are not damaged during cover removal.

4.2.3 Sub-woofer Removal

Caution: Do not disconnect the loudspeaker cable from the subwoofer box when the set is operative, because the class-D amplifier cannot handle a change in load during operation.
It is no problem when the subwoofer is disconnected **before operation**, but a change from connected to disconnected **during operation** can damage the amplifier.

1. Disconnect the loudspeaker cable at the top of the sub-woofer box.
2. The subwoofer is fixed in the bottom plate with two 'rubber feet'.
3. Pull the sub-woofer box upwards, and remove it.

4.3 Service Positions

This chassis has several predefined service positions, for better accessibility. They are explained below in more detail.

4.3.1 Solder Side ‘3rd SCART’ panel

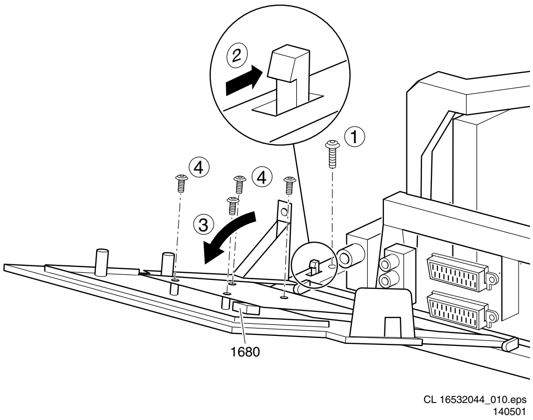


Figure 4-2 Service position 1

To remove or access the ‘3rd SCART’ panel, do the following:
1. Remove fixation screw [1].
2. To release the fixation peg, push it towards the CRT [2].
3. At the same time, pull the complete module away from the LSP [3]. It hinges in the LSP-bracket.
4. To remove the panel, disconnect the flat-cable from connector 1680 and remove the four panel screws [4].

4.3.2 Component Side LSP

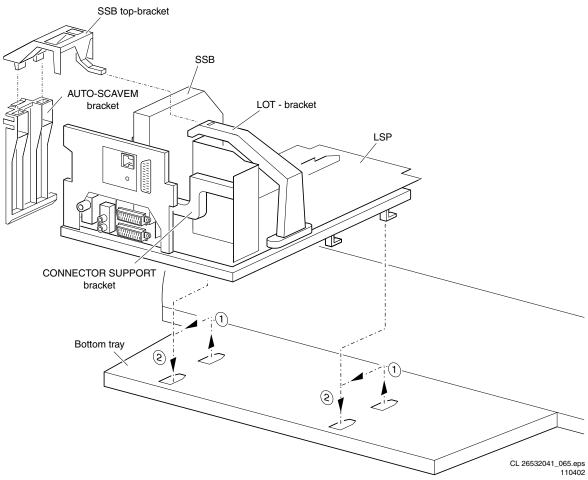

SSB top-bracket
SSB
AUTO-SCAVEM bracket
LOT - bracket
LSP
CONNECTOR SUPPORT bracket
Bottom tray
①
②
①
②
CL 26532041_065.eps
110402

Figure 4-3 Service position 2

For better accessibility of the LSP, do the following (see figure above):

1. Remove the LSP-bracket from the bottom tray by pulling it backwards.
2. Hook the bracket in the first row of fixation holes of the bottom tray. In other words, reposition the bracket from [1] to [2].

4.3.3 Solder Side LSP

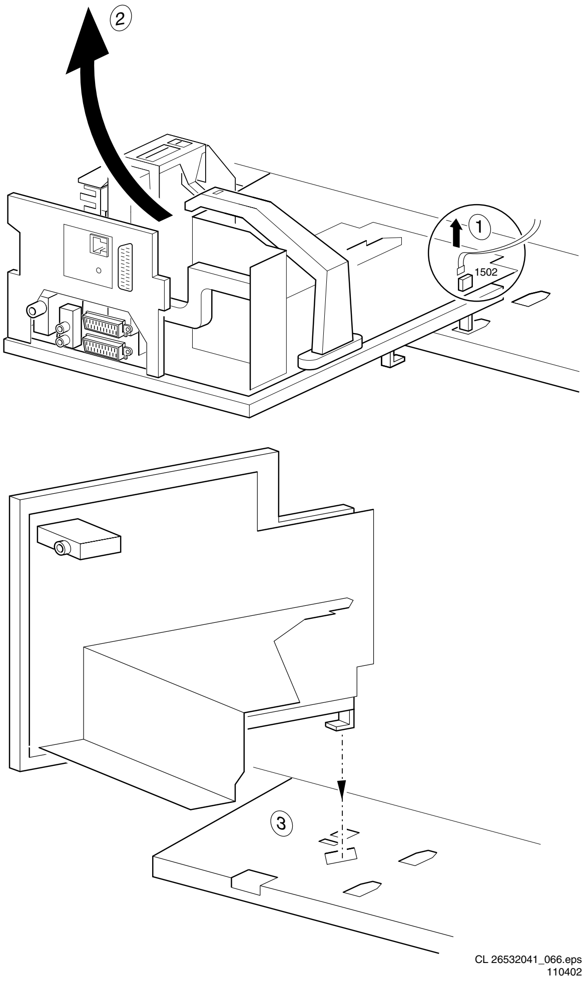

②
①
1502
③
CL 26532041_066.eps
110402

Figure 4-4 Service position 3

To get access to the bottom side (solder side) of the LSP, do the following (see figure above):

1. Remove the DAF-module (see paragraph 'DAF Assy/panel' below
2. To disconnect the degaussing coil from the LSP, remove the cable from connector 1502 [1].
3. Release the wiring from their fixation clamps, in order to get room for repositioning the LSP.
4. Flip the LSP 90 degrees clockwise [2], and place it in the fixation hole at the left side of the bottom tray [3].

4.3.4 Small Signal Board (SSB)

In fact, there is no predefined service position for the SSB. Most test points are located on the A-side (side that is facing the tuner). If you have to replace ICs, you must take the complete SSB module out of the SIMM-connector.
Note: For good access to the A-side, it is necessary to remove the Auto-Scavem assy (at the left side of the SSB). See description in paragraph 'Auto-Scavem Assy/Panel' below.

To get access to the SSB test points, do the following:

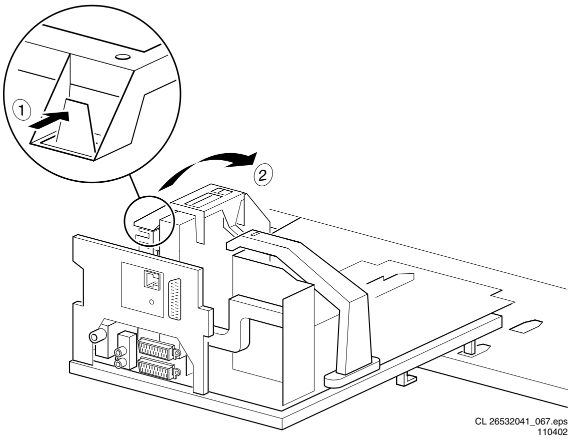
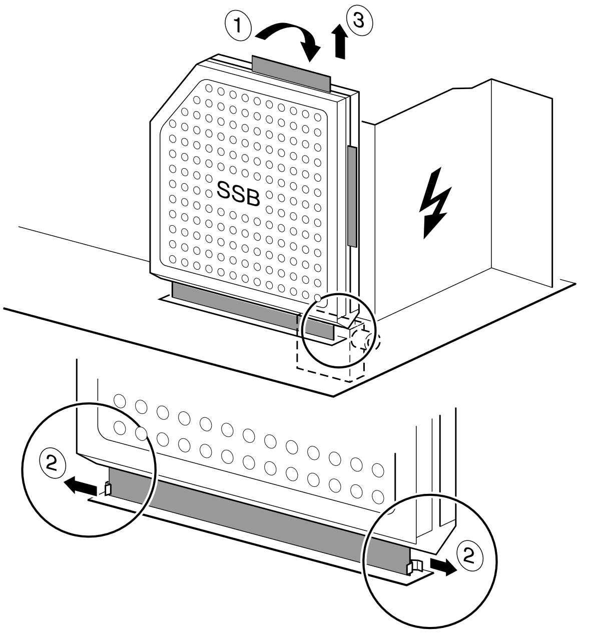

①
②
CL 26532041_067.eps
110402

Figure 4-5 SSB removal (part 1)

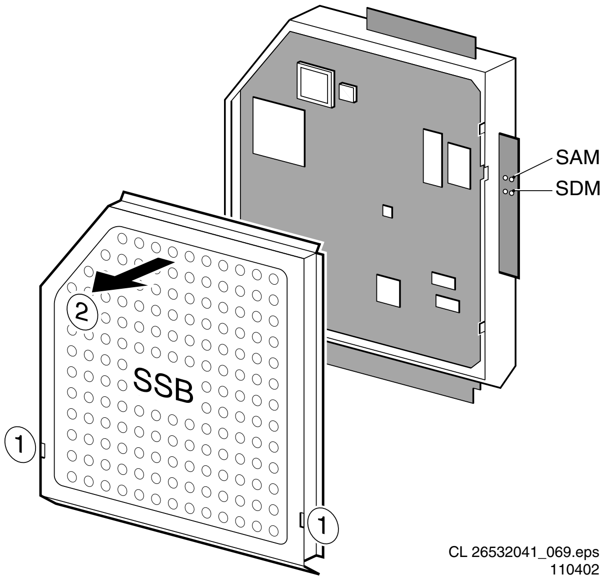
1. Put the LSP in service position 2 (as described above).
2. Release the two clamps at the top of the SSB bracket [2] and pull the bracket upward (it hinges in the bracket at the LOT side).
3. Now you can remove the complete SSB bracket.



CL 26532041_068.eps
110402

Figure 4-6 SSB removal (part 2)

1. Push the top of the SSB towards the LOT [1].
2. Due to the pressure, the two metal clamps at both sides of the SIMM-connector will release [2].
3. Take the complete SSB out [3].



CL 26532041_069.eps
110402

Figure 4-7 SSB removal (part 3)

1. Once you have taken out the SSB, remove the shieldings [2]. Sometimes it is necessary to unsolder some solder-tags first [1].
2. Now re-place the SSB module in the SIMM-connector in reverse order.

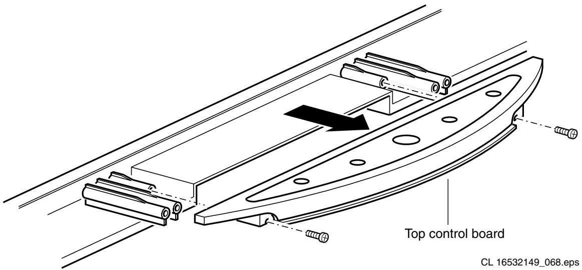
Notes:

- For better access to the SSB, it is possible to order an 'extension board' under number **9965 000 05769**.
- If necessary for the measurement, you can put the LSP in 'service position 2' (as described above).

4.4 Assy / Board Removal

Sometimes, it can be necessary to swap a complete assy or Printed Wiring Board (PWB). How that can be done is explained below.

4.4.1 Top Control Assy/Panel

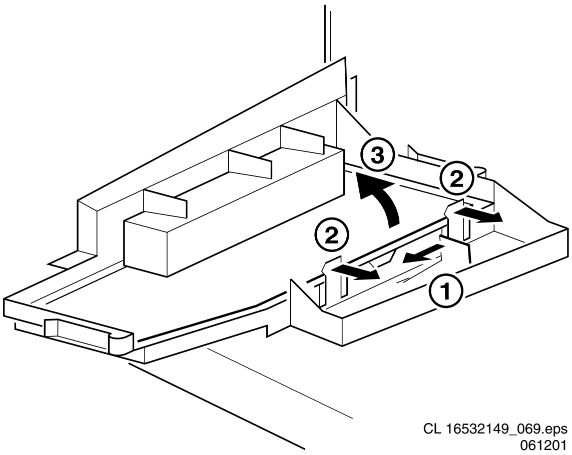


CL 16532149_068.eps
051201

Figure 4-8 Top control assy

1. Release both fixation screws about 5 full turns.
2. Pull the complete assy back- and upwards (it hinges in the cabinet front).
3. Flip the assy, and you can access the board by releasing (carefully) the four fixation clamps.

4.4.2 Side-I/O Assy and Panel

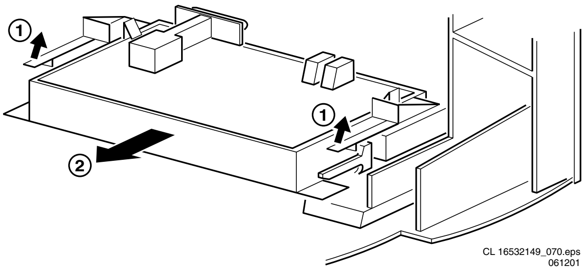


CL 16532149_069.eps
061201

Figure 4-9 Side I/O assy

1. Release the snap-hook [1] with your finger.
2. At the same time, pull the assy backwards [2].
3. Release the two fixation clamps on the right side of the bracket (the board hinges at the left side).
4. Remove the board from the bracket.

4.4.3 Mains Switch Assy/Panel

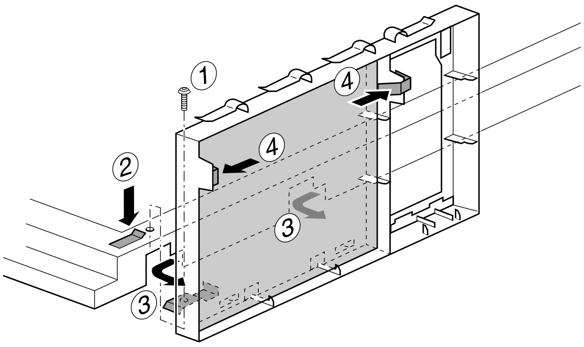


CL 16532149_070.eps
061201

Figure 4-10 Mains Switch Assy

1. Release the two fixation clamps (rather difficult to reach), by pushing them upwards [1]. At the same time, pull the complete assy backwards [2].
   Note: be aware that the degaussing coil can hamper this.
2. Release the two fixation clamps on the two sides of the bracket (the board hinges at the connector side).
3. Remove the board from the bracket.
4. When the light guide (sitting in the cabinet, in front of the LEDs) is defective, you can replace it by pushing it forwards at the left side (it hinges at the right side, seen from the rear).

4.4.4 DAF Assy/Panel



CL 16532044_011.eps
150501

Figure 4-11 DAF-module

1. Remove the fixation screw [1] (if present).
2. Push down the fixation clamp [2], and pull the complete bracket at the same time away from the CRT [3]. The module is now free from the LSP-bracket.
3. Release the fixation clamps [4], in order to remove the print from its bracket.

4.4.5 Auto-SCAVEM Assy/Panel

This panel is placed on the left side of the SSB (See figure ’Service position 2‘). Because most of its components are placed on the bottom side, you must lift the panel from its bracket before you can measure it.

1. Therefore, release the two fixation clamps at the top.
2. Lift the panel from the bracket (it hinges at the bottom).

To remove the bracket:

1. First, remove the panel from the bracket, as described above.
2. Then, remove the two fixation screws at the bottom.
3. Lift the Auto-Scavem bracket slightly up, and at the same time bend the top a little away from the tuner.
4. Now, push the bracket into the direction of the CRT, and lift it out of the LSP-bracket.

4.4.6 Small Signal Board (SSB)

See paragraph 'Small Signal Board (SSB)' above.

4.4.7 Large Signal Panel (LSP)

1. Remove the SSB (see paragraph 'Small Signal Board (SSB)' above).
2. Remove the Auto-Scavem assy (see paragraph 'Auto Scavem Assy/Panel' above).
3. Disconnect the necessary cables.
4. Release the fixation clamps on the left of the LSP-bracket (the board hinges at the right side).
5. Remove the board from the bracket.

4.5 Set Reassembly

To reassemble the whole set, do all processes in reverse order.

Be sure that, before the rear cover is mounted:

- The mains cord is mounted correctly in its guiding brackets.
- All wires/cables are returned in their original positions. This is very important due to the large 'hot' area of the set

5. Service Modes, Error Codes and Fault Finding

Index of this chapter:

1. Test points
2. Service Modes
3. Problems and solving tips (related to CSM)
4. ComPair
5. Error Codes
6. The blinking LED procedure
7. Protections
8. Repair tips

5.1 Test Points

The chassis is equipped with test points printed on the circuit board assemblies. They refer to the diagram letters. The numbering is in a logical sequence for diagnostics. Always start diagnosing (within a functional block), in the sequence of the relevant test points for that block.

Perform measurements under the following conditions:

- Service Default Mode.
- Video: colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Mode (CSM) is used for communication between a Philips Customer Care Centre (P3C) and a customer.

There is also the option of using ComPair, a hardware interface between a computer (see requirements below) and the TV chassis. It offers the ability of structured troubleshooting, test pattern generation, error code reading, software version readout, and software upgrading.
Minimum requirements: a Pentium processor, Windows 95/98, and a CD-ROM drive (see also paragraph 5.4).

5.2.1 Service Default Mode (SDM)

Purpose

- To create a pre-defined setting, to get the same measurement results as given in this manual.
- To override SW protections.
- To start the blinking LED procedure.

Specifications

- Tuning frequency: 475.25 MHz for PAL/SECAM.
- Colour system: SECAM L for France or PAL B/G for the rest of Europe.
- All picture settings at 50 % (brightness, colour, contrast).
- All sound settings at 50 %, except volume at 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (Sleep) timer.
  - Child/parental lock.
  - Blue mute.
  - Automatic volume limiter (AVL).
  - Auto switch-off (when no video signal was received for 10 minutes).
  - Skip/blank of non-favourite pre-sets.
  - Smart modes.
  - Auto store of personal presets.
  - Auto user menu time-out.

How to enter SDM

Use one of the following methods:

- Use the standard RC-transmitter and key in the code '062596', directly followed by the ‘MENU’ button.
  Note: It is possible that, together with the SDM, the main menu will appear. To switch it off, push the ‘MENU’ button again.
- When you shorten for a moment the two solder pads on the 'external part' of the SSB print, with the indication SDM. Activation can be performed in all modes, except when the set has a problem with the main-processor. **Caution**: If the SDM is entered via the pins, all the software-controlled protections are de-activated.
- Use the DST-emulation feature of ComPair.
- Use the ‘DEFAULT’ button on the Dealer Service Tool (RC7150).

After entering this mode, 'SDM' will appear in the upper right corner of the screen.

How to navigate

When you press the 'MENU' button on the RC transmitter, the set will toggle between the SDM and the normal user menu (with the SDM mode still active in the background).

How to exit SDM

Use one of the following methods:

- Switch the set to STANDBY via the RC-transmitter.
- Press the 'EXIT' button on the DST.
- Via a standard customer RC-transmitter: key in '00'-sequence.

5.2.2 Service Alignment Mode (SAM)

Purpose

- To perform (software) alignments.
- To change option settings.
- To easily identify the used software version.
- To view operational hours.
- To display (or clear) the error code buffer.

Specifications

- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to enter SAM

Use one of the following methods:

- Via a standard RC transmitter: key in the code '062596' directly followed by the 'OSD [i+]' button
- Short for a moment the two solder pads on the 'external part' of the SSB print, with the indication SAM.
- Use the DST-emulation feature of ComPair.
- Press the ALIGN button on the DST while the set is in the normal operation

After entering this mode, 'SAM' will appear in the upper right corner of the screen.

Contents of SAM:

- **Rom Version.** Displays the date of the software and the software version of the ROM
  (**example**: EM5EU1-1.0_01234= AAABBC-X.Y_NNNNN).
  - AAA= the chassis name (EM5).
  - BB= the region: EU= Europe, AP= Asia Pacific PAL/Multi, AN= Asia Pacific NTSC, US= USA, LT= LATAM.
  - C= the language cluster number.
  - X.Y= the software version, where X is the main version number (different numbers are not compatible with one another) and Y is the sub version number (a higher number is always compatible with a lower number).
  - NNNNN= last five digits of 12nc code software.

- **Operation Hours.** Displays the accumulated total of operation hours (not the standby hours).
- **Errors** (followed by maximal 10 errors). The most recent error is displayed at the upper left (for an error explanation see paragraph 5.5).
- **Defect. Module.** Here the module that generates the error is displayed. If there are multiple errors in the buffer, which are not all generated by a single module, there is probably another defect. It will then display the message 'Unknown' here.
- **Reset Error Buffer.** When you press the 'OK' button, the error buffer is reset.
- **Alignments.** This will activate the 'Alignments' sub-menu.
- **Dealer Options.** Extra features for the dealers.
- **Service Options.** Extra features for Service.
- **Initialise NVM.** When an NVM was corrupted (or replaced) in the former EM3 chassis, the microprocessor replaces the content with default data (to assure that the set can operate). However, all pre-sets and alignment values are gone now, and option numbers are also not correct. So, this was a very drastic way.
  In the EM5 chassis, the procedure is implemented in another way: The moment the processor recognises a corrupted NVM, an extra line will be added to the SAM menu: '**Initialise NVM**'.
  Now, you can do two things (dependent of the service instructions at that moment):
  – Save the content of the NVM via ComPair for development analysis, **before** initialising. This will give the Philips Service department an extra possibility for diagnosis (e.g. when Development asks for this).
  – Initialise the NVM (same as in the past, however now it happens conscious).
- **Store Options.** All options are stored when pressing the 'OK'-button
- **Functional Test.** All devices are tested via the 'OK' button. Eventual errors are displayed in the error buffer. The error buffer is not erased, the content returns when this test is terminated.
- **Broadcast Info.** The purpose of this menu is to debug the broadcast, NOT the TV. The menu gives an overview of what is received on the current preset related to Time extraction, CNI codes, and NexTView transmission.
  Following items are displayed:
  – **Preset.** Shows the preset number.
  – **Local.** Local date and time from the selected preset.
  – **UTC** (Coordinated Universal Time). Extracted from the selected preset.
  – **LTO** (Local Time Offset). Extracted from the selected preset.
  – **CNI** (Country and Network Identification). Extracted from the current preset (displayed as a four digit hexadecimal number. The CNI number identifies the broadcaster.
  – **NexTView service** (optional). This item gives information about the type of NexTView service that is available for the current preset. The possible strings are:
    1. NexTView provider.
    2. NexTView data available from preset xx (where xx is the preset number).
    3. No NexTView data available.
  – **CNI Linking** (optional). 'Link' refers to the connection between the broadcasted NexTView programme information and the preset number. The possible strings are:
    1. Data available for preset xx xx xx (where xx xx xx is a list off all presets for which a CNI link is available).
    2. 'Automatic link' or ' Manual link', depending on what is read from the broadcast and from the CNI table in the NVM. 'Automatic' means that the link has been made based on broadcasted information, without user-interaction. 'Manual' means that the user has established this link by selecting a preset in the pop-up menu that you get after setting a reminder/recording/lock/watch in EPG. Erase a wrong 'Manual link' by entering the Manual Installation menu and (without changing anything) activate 'Store'.
    3. Nothing is shown.

How to navigate

- In SAM, you can select the menu items with the CURSOR UP/DOWN key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the CURSOR UP/DOWN key to display the next/previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  – (De) activate the selected menu item.
  – Change the value of the selected menu item.
  – Activate the selected submenu.

How to exit SAM

Use one of the following methods:

- Press the 'MENU' button on the RC-transmitter, or
- Switch the set to STANDBY (⏻) via the RC-transmitter, or
- Press the 'EXIT' button on the DST.

5.2.3 Customer Service Mode (CSM)

Purpose

When a customer is having problems with his TV-set, he can call his dealer. The service technician can than ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.
The CSM is a read only mode; therefore, modifications in this mode are not possible.

How to enter CSM

Use one of the following methods:

- Press the 'MUTE' button on the RC-transmitter **simultaneously** with the 'MENU' button on the TV (top control) for (at least) 4 seconds.
- Key in the code '123654' via the standard RC transmitter.

Note: Activation of the CSM is only possible if there is no (user) menu on the screen!

How to navigate

By means of the 'CURSOR-DOWN/UP' knob on the RC-transmitter you can navigate through the five menus.

Contents of CSM

Customer Service Menu 1

- **Software version (example: EM5EU1-1.0_01234).** Displays the build in software version. In case of field problems related to software, software flash-RAM pos.7006 must be changed by a new one. Do this via soldering. You will find details of the software versions in the chapter 'Software Survey' of the 'Product Survey - Colour Television' publication. This publication is generated four times a year.
- **Feature Box.** The 12NC-number of the build in Feature Box software
- **Set Type.** This information is very helpful for a helpdesk/ workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set.
- **Code 1.** Gives the last 5 errors of the error buffer. As soon as the built-in diagnose software has detected an error the buffer is adapted. The last occurred error is displayed on the leftmost position. Each error code is displayed as a 3-digit number. When less than 10 errors occur, the rest of

the buffer is empty ('000'). See also paragraph 5.5 for a description.

- **Code 2.** Gives the first 5 errors of the error buffer. See also paragraph 5.5 for a description.
- **Volume.** Gives the last status of the volume as set by the customer. The value can vary from 0 (volume is minimum) to 100 (volume is maximum). Volume values can be changed via the volume key on the RC-transmitter.
- **Brightness.** Gives the last status of the brightness as set by the customer. The value can vary from 0 (brightness is minimum) to 100 (brightness is maximum). Brightness values can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'BRIGHTNESS'.
- **Contrast.** Gives the last status of the contrast as set by the customer. The value can vary from 0 (contrast is minimum) to 100 (contrast is maximum). Contrast values can be changed via 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'CONTRAST'.
- **Colour.** Gives the last status of the colour saturation, as set by the customer. The value can vary from 0 (colour is minimum) to 100 (colour is maximum). Colour values can be changed via 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'COLOUR'.
- **Hue.** Only relevant for NTSC-signals (e.g. some NTSC-DVD-discs).

Customer Service Menu 2

- **Sharpness.** Gives the sharpness value. The value can vary from 0 (sharpness is minimum) to 7 (sharpness is maximum). In case of bad antenna signals, a too high value of the sharpness can result in a noisy picture. Sharpness values can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'SHARPNESS'.
- **Headphone volume.** Gives the last status of the headphone volume, as set by the customer. The value can vary from 0 (volume is minimum) to 100 (volume is maximum). Headphone volume values can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'SOUND' and 'HEADPHONE VOLUME'.
- **Dolby.** Indicates whether the received transmitter transmits Dolby sound ('ON') or not ('OFF'). Attention: The presence of Dolby can only be tested by the software on the Dolby Signalling bit. If a Dolby transmission is received without a Dolby Signalling bit, this indicator will show 'OFF' even though a Dolby transmission is received.
- **Surround Mode.** Indicates the by the customer selected surround mode (or automatically chosen mode). In case the set is a Non-Dolby set there will be displayed '0'. If it is a Dolby-set then is displayed: 'Stereo', '3 Stereo', '3D Surround', 'Dolby Pro Logic', 'Dolby Digital', 'Hall' or 'MPEG Multi-channel'. These settings can be influenced after pressing the 'MENU' button and selecting 'SOUND' and 'SOUND MODE'. It can also have been selected automatically by signalling bits (internal software).
- **Tuner Frequency.** Indicates the frequency the selected transmitter is tuned to. The tuner frequency can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys for fine tune after opening the installation menu and selecting 'INSTALL' and 'MANUAL INSTALL'.
- **Front L Trim.** Indicates the difference between main volume and volume of front left speaker. Change via: 'MENU', 'SETUP', 'SPEAKERS', and 'FRONT LEFT VOLUME'. The value can vary from '-10' to '+10'
- **Front R Trim.** Indicates the difference between main volume and volume of front right speaker. Change via: 'MENU', 'SETUP', 'SPEAKERS', and 'FRONT RIGHT VOLUME'. The value can vary from '-10' to '+10'
- **Digital Option.** Gives the selected digital mode, '100 HZ', 'Digital Scan', 'Natural Motion', 'Double Lines', or 'Pixel Plus'. Change via 'MENU', 'PICTURE', 'DIGITAL OPTIONS'.
- **Centre Trim.** Indicates the difference between main volume and volume of centre speaker. Change via: 'MENU', 'SETUP', 'SPEAKERS', and 'CENTRE VOLUME' (not available when 'Surround Mode' is set to 'STEREO' or 'HALL'). The value can vary from '-10' to '+10'
- **TV System.** Gives information about the video system of the selected transmitter.
  - BG: PAL BG signal received.
  - DK: PAL DK signal received.
  - I: PAL I signal received.
  - L: SECAM L signals received.
  - M38.9: NTSC M signal received with video carrier on 38.9 MHz.

Customer Service Menu 3

- **Balance.** Indicates the balance settings, between '-50' and '+50'. Change via 'MENU', 'SOUND', and 'BALANCE'. Not applicable for Dolby Pro Logic sets.
- **Centre mode.** Indicates if centre mode is set 'ON' or 'OFF'. When centre mode is on, all TV speakers are used as one centre speaker. Change Centre mode via 'MENU', 'SETUP', 'SPEAKERS', and 'CENTRE MODE'.
- **DNR.** Gives the selected DNR setting (Dynamic Noise Reduction), 'OFF', 'MINIMUM', 'MEDIUM', or 'MAXIMUM'. Change via 'MENU', 'PICTURE', 'DNR'
- **Noise figure.** Gives the noise ratio for the selected transmitter. This value can vary from 0 (good signal) to 127 (average signal) and to 255 (bad signal).
- **Source.** Indicates which source is used and the signal quality of the selected source. Source: 'TUNER', 'EXT1', 'EXT2', 'EXT3', 'EXT4', or 'SIDE'. Signal Quality: 'VIDEO/STEREO', 'VIDEO/NICAM', 'VIDEO/SPDIF', 'S-VIDEO/STEREO', 'S-VIDEO/NICAM', 'S-VIDEO/SPDIF', 'RGB/STEREO', 'RGB/SPDIF', '480P/STEREO', '576P/STEREO' or '1080i/STEREO'.
- **Audio System.** Gives information about the audio system of the selected transmitter: 'Analogue Mono', 'Analogue Stereo', 'PCM 2/0', 'DD 1/0', 'DD 2/0 LtRt', 'DD 2/0 L0R0', 'DD 2/1', 'DD 2/2', 'DD 3/0', 'DD 3/1', 'DD 3/2', 'DD 1+1', 'MPEG 1/0', 'MPEG 2/0', 'MPEG 2/0 LtRt', 'MPEG 2/1', 'MPEG 2/2', 'MPEG 3/0', 'MPEG 3/1', 'MPEG 3/2', 'MPEG 1+1' or 'MPEG 2+2'.
- **Tuned bit.** Gives information about the tuning method of the stored pre-set. If a channel is found via 'automatic installation', you will see the value 'Off'. When you change this (automatically found) frequency via 'fine tune' adjustment (installation menu - manual installation), the displayed value will change to 'On'. Therefore, when you see the value 'On' in this line, it is an indication that the received channel is a non-standard signal (e.g. of a VCR).
- **Surround Speakers.** Indicates if the surround speakers are set 'ON' or 'OFF'. Change via 'MENU', 'SETUP', 'SPEAKERS', and 'SURROUND SPEAKERS'.
- **On Timer.** Indicates if the 'On Timer' is set 'ON' or 'OFF' and if the timer is 'ON' also displays start time, start day and program number. Change via 'MENU', 'TV', 'FEATURES', and 'ON TIMER'.
- **Preset Lock.** Indicates if the selected preset has a child lock: 'LOCKED' or 'UNLOCKED'. Change via 'MENU', 'TV', 'FEATURES', 'CHILD LOCK', and 'CUSTOM LOCK'.

Customer Service Menu 4

- **Child Lock.** Indicates the last status of the general child lock: 'UNLOCK', 'LOCK', or 'CUSTOM LOCK'. Change via 'MENU', 'TV', 'FEATURES', 'CHILD LOCK', and 'LOCK'.
- **Age Lock.** Indicates the last status of the EPG rating for child lock: 'OFF', '4 years', '6 years', '8 years', '10 years', '12 years', '14 years' or '16 years'. This is only displayed if child lock is set to 'CUSTOM LOCK'

- **Lock After.** Indicates at what time the child lock is set: 'OFF' or e.g. '18:45' (lock time). This is only displayed if child lock is set to 'CUSTOM LOCK'
- **Category Lock.** Indicates the last status of the EPG theme childlock: 'MOVIES', 'NEWS', 'SHOWS', 'SPORTS', 'CHILDREN', 'MUSIC', 'CULTURE', or 'SERIES'. This is only displayed if child lock is set to 'CUSTOM LOCK'. It is possible that more than one value is shown.
- **Program Category.** Indicates the theme of the selected transmitter: 'MOVIES', 'NEWS', 'SHOWS', 'SPORTS', 'CHILDREN', 'MUSIC', 'CULTURE', or 'SERIES'.
- **SW Code 1.** Not applicable.
- **SW Code 2.** Not applicable.
- **TV Ratings Lock.** Only applicable for US.
- **Movie Ratings Lock.** Only applicable for US.
- **V-chip TV Status.** Only applicable for US.

Customer Service Menu 5

- **V-chip Movie Status.** Only applicable for US.
- **Options 1.** Gives the option codes of option group 1 as set in SAM (Service Alignment Mode).
- **Options 2.** Gives the option codes of option group 2 as set in SAM (Service Alignment Mode).

SW Event-log

This item contains 'software event logging' information that can be delivered to the development centre on special request.

How to exit CSM

Use one of the following methods:

- After you press a key on the RC-transmitter (with exception of the 'CHANNEL', 'VOLUME' and digit (0-9) keys), or
- After you switch the TV-set 'OFF' with the mains switch.

5.3 Problems and Solving Tips (related to CSM)

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described above. New value(s) are automatically stored.

5.3.1 Picture Problems

Snowy/noisy picture

1. Check line 24 'Noise Figure'. In case the value is 127 or higher, and the value is also high on other programs, check the aerial cable/aerial system.
2. Check lines 11 'Sharpness' and 24 'Noise Figure'. In case the value of line 11 is 3 or 4 and the value of line 24 is high (127 or higher), decrease the 'Sharpness' value.

Picture too dark

1. Press 'Smart Picture' button on the RC-transmitter. In case the picture improves, increase the 'Brightness' or the 'Contrast' value. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.
2. Check line 7 'Brightness' and 8 'Contrast'. If the value of line 7 is low (< 10) or the value of line 8 is low (< 10), increase the 'Brightness' or the 'Contrast' value.

Picture too bright

1. Press 'Smart Picture' button on the RC-transmitter. In case the picture improves, decrease the 'Brightness' or the 'Contrast' value. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.
2. Check lines 7 'Brightness' and 6 'Contrast'. If the value of line 7 is high (> 40) or the value of line 8 is high (> 50). Decrease the 'Brightness' value or increase the 'Contrast' value.

White line around picture elements and text

1. Press 'Smart Picture' button on the Remote Control. In case the picture improves, decrease the 'Sharpness' value. The new value is automatically stored (in 'personal' pre-set) for all TV channels.
2. Check line 11 'Sharpness'. Decrease the 'Sharpness' value. The new value is automatically stored for all TV channels.

No picture

Check line 27 'Tuned bit'. In case the value is 'On', install the required program again. Open the installation menu and perform manual installation.

Blue picture

1. No proper signal is received. Check the aerial cable/aerial system.

Blue picture and/or unstable picture

1. A scrambled or decoded signal is received.

Black and white picture

Check line 9 'Colour'. In case the value is low (< 10), increase the 'Colour' value. The new value is automatically stored for all TV channels.

No colours/colour lines around picture elements or colours not correct or unstable picture

1. Check line 20 'TV System'. If a 'strange' system pop's up, something has gone wrong during installation. Re-install the channel.
2. In case line 20 is 'L', the installed system for this pre-set is 'France', while 'West Europe' is required. Install the required program again: open the installation menu and perform manual installation. Select system 'West Europe'.

Menu text not sharp enough

1. Press 'Smart Picture' button on the RC-transmitter. In case picture improves, decrease the contrast value. The new value(s) are automatically stored for all TV channels.
2. Check line 8 'Contrast'. The value of line 8 is high (> 50). Decrease the contrast value.

5.3.2 Sound Problems

No sound from left and right speaker

Check line 6 'Volume'. The value is low. Increase the value of 'Volume'. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.

Sound too loud for left and right speaker

Check line 6 'Volume'. The value is high. Decrease the value of 'LS Volume'. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.

5.4 ComPair

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I^2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I^2C commands yourself because ComPair takes care of this.

- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In case of the EM5E chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector.

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- **Automatic** (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I^2C level. ComPair can access the I^2C bus of the television. ComPair can send and receive I^2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I^2C busses of the TV-set.
- **Manually** (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extends. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the faultfinding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:

- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink. **Example**: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier.*
  - Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  - Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

5.4.3 Stepwise Start-up / Shut-down

Under normal circumstances, a fault in the power supply, or an error during start-up, will switch the television to protection mode. ComPair can take over the initialisation of the television. In this way it is possible to distinguish which part of the start-up routine (hence which circuitry) is causing the problem.

Stepwise start- up explanation
This is realised via ComPair and is very helpful when a **protection** is activated (see also chapter 5.7).

Table 5-1 Stepwise start-up table

State	Description mode	Display LED (Red)	Enabled protection
0	Low power stdby: 5V2/3V3 present, uP in stdby-mode	On	None
1	High power Stdby: TV-set in stdby-mode	Wait 1s, flash 1 x	None
2	SSB is powered by stdby-supply (5V/8V). Degaussing (12 s) has been activated.	Wait 1s, flash 2 x	1, 4, 5, 6 & 18
3	Semi stdby-mode: HIP, HOP, MSP and Tuner initialized leading to semi stdby-mode.	Wait 1s, flash 3 x	
4	All ICs are initialized, HOP activates the main supply, EHT-generation starts, black current stabilization is on	Wait 1s, flash 4 x	Plus 2 & 16
5	TV On: TV-set operates, unblanked picture.	Wait 1s, flash 5 x	

Stepwise shut-down explanation
In the stepwise shutdown mode, state 2 and 4 are skipped.

Table 5-2 Stepwise shut-down table

State	Description mode	Display LED (Red) (*)	Disabled protections
5	TV On: TV-set operates, unblanked picture	Wait 1s, flash 5 x	-
3	Semi stdby-mode: SSB is powered by the stdby-supply	Wait 1s, flash 3 x	2 & 16
1	High power stdby: TV-set in stdby-mode	Wait 1s, flash 1 x	1, 4, 5, 6 & 18
0	Low power stdby: 5V2/3V3 present, uP in stdbymode	On	

Note (*): When the set is in stepwise mode and, due to stepping-up, a protection is activated, the set will really go into protection (blinking LED). The set will not leave the stepwise-mode however. By stepping up, the set can be activated again, until state X where the protection was activated. At state (X-1) diagnostic measurements can be performed.

5.4.4 How To Connect

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with 'PC') of the ComPair interface.
3. Connect the mains adapter to the supply connector (marked with 'POWER 9V DC') of the ComPair interface.
4. Switch the ComPair interface 'OFF'.
5. Switch the television set 'OFF' with the mains switch.
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with 'I^2C') and the ComPair connector at the rear side of the TV (situated just below the tuner input, see also chapter 4).

7. Plug the mains adapter in a mains outlet, and switch the interface 'ON'. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the 'Introduction' chapter.

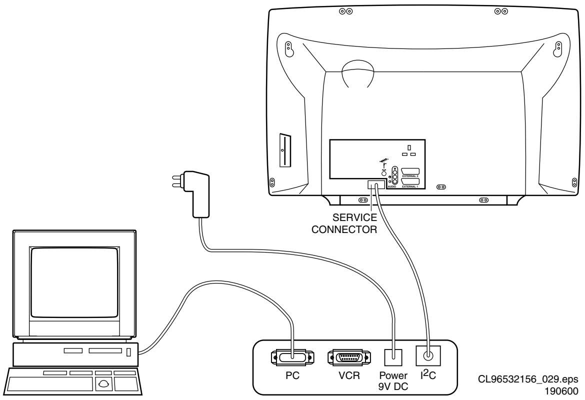


Figure 5-1 ComPair Interface connection

5.4.5 How To Order

ComPair order codes:
- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070.
- SearchMan32 CD (update): 3122 785 60080.
- ComPair interface cable: 3122 785 90004.

5.5 Error Codes

5.5.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.
When an error has occurred, the error is added to the list of errors, provided the list is not full or the error is a protection error.
When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained), except when the error is a protection error.
To prevent that an occasional error stays in the list forever, the error is removed from the list after 50+ operation hours.
When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

5.5.2 How to read the Error Buffer

Use one of the following methods:
- On screen via the SAM (only if you have a picture). Examples:
  - **0 0 0 0 0**: No errors detected
  - **6 0 0 0 0**: Error code 6 is the last and only detected error
  - **9 6 0 0 0**: Error code 6 was first detected and error code 9 is the last detected error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

5.5.3 How to clear the Error Buffer

Use one of the following methods:
- By activation of the 'RESET ERROR BUFFER' command in the SAM menu.
- With a normal RC, key in sequence 'MUTE', followed by '062599' and 'OK'.
- When you transmit the commands 'DIAGNOSE' - '99' - 'OK' with ComPair (or with a DST).
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

5.5.4 Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. This to ensure that old error codes are no longer present. Before clearing the buffer, write down the content, as this history can give you significant information.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).
There are various errors:
- I^2C device errors.
- I^2C bus errors.
- Protection errors.
- Errors not related to I^2C device, but of importance:
  - Black Current Loop Error (error 28): detection of a continuous fail of the black current stabilisation loop of the HOP.
  - FALCONIC Error (error 26): at start-up, after initialisation of the PICNIC, the presence of the FALCONIC can be checked.
  - Eagle Error (error 27): at start-up, after initialisation of the PICNIC, the presence of the Eagle can be checked.

Table 5-3 Error Table

Error	Device	Description	Def. item	Defect. module indication	Diagram
1	M24C32	NVM, spontaneous blinking 1-1-1..	7011	NVM	B5
2	Hfail Protection	Horizontal Flyback protection	7301	HFB protection	B4
3	SAA4978	PICNIC	7713	PICNIC	B3a
4	Supply 5V	5V2 protection		5V Protection	B5
5	Supply 8V	8V6 protection		8V Protection	B5
6	Slow I^{2}C bus blocked				B5
7	TDA9330/HOP	High-end Output Processor	7301	HOP video control/geometry	B4
8	TDA9320/HIP	High-end Input Processor	7323	HIP I/O-video processing	B2
9	PCF8574	Wireless Expander	7501	Wireless Expander	H
11	Reserved				
12	TDA9178		7302	TOPIC (LTP Peaking)	B4
13	UV1316/ TEDE9		1200	Tuner Protection	A8
14	MSP3411/3412/3452		7651	ITT sound processor	B6
15	Reserved				
16	FBX			Feature Box Protection	B3
17	Reserved				
18	Fast I^{2}C bus blocked				B5
19	TDA8444		7500	Auto Scavem DAC	SC1
26	SAA4992	FALCONIC	7718	Falconic	B3b
27	T8F24EF	Eagle	7724	Eagle device	B3c
28	Black current loop			Black current loop	
30	PCF8574T/PCF8584T	only for DVD models	7150	DVD Interface	
31	--	only for DVD models		DVD Engine	
32	M29W400BT	Flash Ram (EPG)	7012	Flash Ram (EPG)	B5

Note: Error codes 1, 6 or 18 are protection codes and in this case, supplies of some circuits will be switched off. Also, in protection, the LED will blink the number of times equivalent to the most recent error code.

5.6 The Blinking LED Procedure

5.6.1 Introduction

Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful for fault finding, when there is no picture.

When the SDM is entered, the front LED will show (blink) the contents of the error-buffer. Error-codes = 10 are shown as follows:

- A long blink of 750 ms (which is an indication of the decimal digit),
- A pause of 1.5 s,
- 'n' short blinks (where 'n' = 1 - 9),
- When all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
- The sequence starts again.

Example: Error 12 9 6 0 0.
After activation of the SDM, the red front LED will show:

- 1 long blink of 750 ms (which is an indication of the decimal digit) followed by a pause of 1.5 s,
- 2 short blinks followed by a pause of 3 s,
- 9 short blinks followed by a pause of 3 s,
- 6 short blinks followed by a pause of 3 s,
- 1 long blink of 3 s to finish the sequence,
- The sequence starts again.

Note: If errors 1, 6 or 18 occur, the LED always gives the last occurred error even if the set is NOT in service mode.

5.6.2 How to Enter

Use one of the following methods:

- Enter the SDM (only via soldering pads marked 'SDM' on SSB). The blinking red front LED will show the entire contents of the error buffer (this works in 'normal operation' mode and in 'protection' mode).
- Transmit the commands 'MUTE' - '062500' - 'OK' with a normal RC. The complete error buffer is shown. This works only in 'protection' mode.
- Transmit the commands 'MUTE' - '06250x' - 'OK' with a normal RC (where 'x' is a number between 1 and 5). When x= 1 the last detected error is shown, x= 2 the second last error, etc.... This works only in 'protection' mode.

5.7 Protections

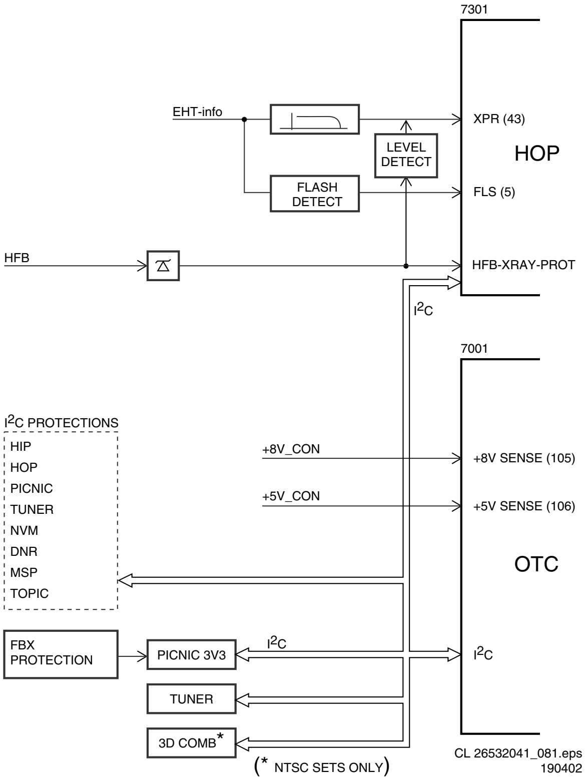
5.7.1 Introduction

The EM5E has only one microprocessor (OTC), which remains active during Standby. This because power of the microprocessor and the attached memory chip set is coming from the 3V3 supply, which is derived from the 5V Standby-circuitry. So, in both Power-on as in Standby mode, the microprocessor is connected to this power supply.
If a fault situation is detected, an error code will be generated and if necessary, the set is put in protection mode. The protection mode is indicated by the blinking of the red front LED at a frequency of 3 Hz (or by a coded blinking in special cases).
In some error cases however, the microprocessor does not put the set in the protection mode (this is the case with the -hardware - loudspeaker protection of the audio amplifier).
The content of the error buffer can be read via the service menu (SAM), the blinking LED procedure or via DST/ComPair. The DST/ComPair 'diagnose' functionality will force the set into the 'Service Standby', which is alike the usual Standby, however the microprocessor remains completely in normal operation.
To get a quick diagnosis, the EM5E has three service-modes implemented:

- The **Customer Service Mode** (CSM).
- The **Service Default Mode** (SDM). Start-up of the set in a predefined way.

- The **Service Alignment Mode** (SAM). In this mode, items of the set can be adjusted via a menu and with the help of test patterns.

You can enter both SDM and SAM modes via the 'service pads' on the SSB, via an RC-transmitter (DST or standard RC), or via ComPair. It is not possible to enter the SAM in 'standby'; the TV has to be in 'normal operation' mode.
The EM5E 'Protection Diagram' shows the structure of the protection system. See diagram below.



CL 26532041_081.eps
190402

Figure 5-2 Protection diagram

There are several types of protections:
- I^2C related protections.
- OTC related protections (via polling on I/O pins or via algorithms).
- HOP related protections (mainly for deflection items).
- Hardware errors that are not sensed by the OTC (e.g. vertical flyback protection, bridge coil protection, E/W protection, arcing protection).

All protections are explained below.

5.7.2 I^2C Related Protections

In normal operation, some registers of the I^2C controlled ICs are refreshed every 200 ms. During this sequence, the I^2C busses and the I^2C ICs are checked.
An I^2C protection will take place if the SDA and SCL lines are short-circuited to ground, or to each other. An I^2C error will also occur, if the power supply of the IC is missing (e.g. FBX_PROT (error 16)).

5.7.3 OTC Related Protections

If a protection is detected at an OTC input, the OTC will start to scan all protection inputs every 200 ms for 5 times. If the protection on one of the inputs is still active after 1 s, the P will put the set in the protection mode. Before the scanning is started, a so-called 'ESD refresh' is carried out. This is done, because the interrupt on one of the inputs is possibly caused either by a flash or by ESD. As a flash or ESD can influence IC settings, the HOP, HIP, MSP, PICNIC, NVM, and Tuner are initialised again, to ensure the normal picture and sound conditions of the set.

8 V and 5 V protection: The μP senses the presence of the 8 V and 5 V (via the '+5V_CON' and '+8V_CON' lines). If one (or both) of these voltages is (are) not present, an error code is stored in the error buffer of the NVM, and the set is put in the protection mode.

5.7.4 HOP Related Protections

Every 200 ms, the status register of the HOP is read by the OTC (via the I^2C bus). If a protection signal is detected on one of the inputs of the HOP, the relevant error bit in the HOP register is set to 'high'. If this error bit is still 'high' after 1 s, the OTC will store the error code in the error buffer of the NVM and, depending on the relevancy of the error bit, the set will either go into the protection mode or not.

The following protections are implemented:
- **HFB (Horizontal Flyback):** If the horizontal flyback is not present, this is detected via the HOP (HFB_X-RAY_PROT). One status bit is set to 'high'. The error code is stored in the error buffer and the set will go into the protection mode.
- **XPR (X-ray protection):** If the HFB pulses are too low (level detection), the HOP will detect this via the XPR-bit. The error will be logged in the error buffer and the set will go into protection mode.

Note: Both errors will be logged as HFB-failure.

5.7.5 Hardware Related Protections

Due to the architecture ('hot' deflection), some protections cannot be sensed by the microprocessor. Three of these protections will lead to a protection on set level (Standby mode and blinking LED), while another will only lead to a circuit protection.

TV-set Protection
The following fault conditions will lead to a 'complete' set protection:
- **BRIDGECOIL protection:** This is sensed via the 'EW' signal going to the base of TS7652 (via R3495 and D6499). In a normal situation, the voltage on C2498 (diagram A4) is high and TS7652 is conducting. When bridge coil 5422 (diagram A3) is short circuited, the voltage on C2498 changes to low, which will block TS7652. In this case, also TS7641 will block and the voltage on 2642 will rise until TS7443 is forced in conduction. The 'SUP-ENABLE' signal (in normal operating condition -20 V) is shorted now to ground level, which will force the Main Power Supply to Standby mode.
- **ARC protection:** If there are 'open' connections (e.g. bad solder joints) in the high-energy deflection circuitry, this can lead to damaging effects (read: fire). For that reason, the E/W current is sensed (via 3479//3480). If this current becomes too high, the 'thyristor' circuit (TS7653 and TS7654) is triggered. TS7442 is switched 'on' and TS7443 is forced into conduction. . The 'SUP-ENABLE' signal is shorted now to ground level, which will force the Main Power Supply to Standby mode.
- **NON_VFB (No vertical Flyback) protection:** If the frame stage generates no pulses, TS7641 will block. TS7443 is now switched 'on', which will lead to Standby mode. So, in normal operation condition, TS7641 and TS7652 are conducting, while TS7443 is blocked.

Circuit Protection
The following fault condition will lead to a 'partly' set protection:
- **PROT1 (DC) protection:** When a DC-voltage (positive or negative) is sensed on one of the loudspeaker outputs, the protection circuit (TS7704, 7705, 7706 and 7707 in

diagram A6) will put the IC7700 in Standby mode (via tri-state input pin 6). For more details, see chapter 9.

5.8 Repair tips

5.8.1 Miscellaneous

The relay you hear when you switch the set 'on' (from Standby or via the mains switch), is from the degaussing circuitry. It is not used for switching the Power Supply (as done in the MG-chassis).

Take care not to touch the ‘hot’ heatsink while disconnecting the SSB, despite the fact that the mains cord is out of the mains socket. There can still be an annoying rest-voltage on the heatsink for a short while. This, because the discharge resistors 3502 and 3503 (on the LSP between hot and cold part) are not stuffed for Europe. Instead, discharge resistors 3066 and 3057 on the Mains Switch panel are used, but because they are located before the Mains switch, they only discharge when this switch is ‘on’.
Advice: when you remove the SSB, disconnect the Mains cord, but keep the Mains Switch ‘on’.

Do not try to measure on the SSB side, which is facing the ‘hot’ heatsink. This is dangerous. Most service test points are guided to the ‘tuner’ side and are indicated by the ‘service’ printing. Where the circuitry was too ‘crowded’ for this printing, you can find the correct location on the ‘test point overviews’ in this manual (chapter 6).

A very large part of the LSP is **'hot'**, such as:
- The primary part of the Standby Supply.
- The whole Main supply (except for the secondary Audio supply).
- And the complete deflection circuitry (so notice that the deflection coil is hot!!).

5.8.2 Start-up Sequence

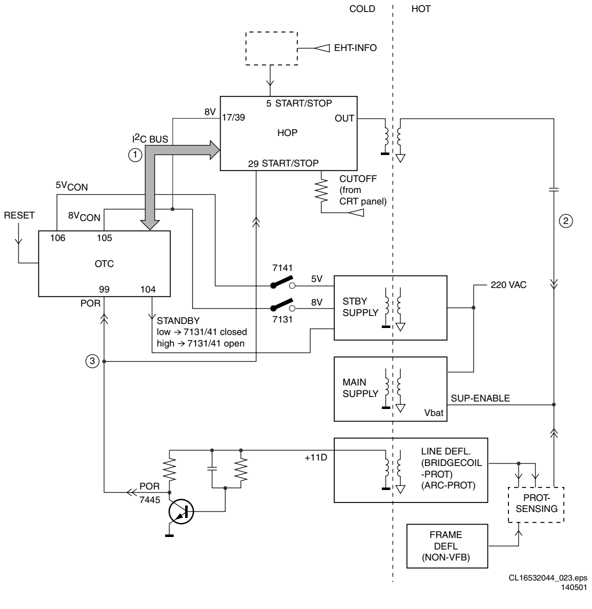


Figure 5-3 Start-up circuitry

The start up sequence differs from other sets (e.g. MG-sets or EM2E-sets, but is same as in EM3E-set):
1. When the set is switched ‘on’, the 5 and 8 V lines (‘+5V_CON’ and ‘+8V_CON’) of the standby power supply are activated.
2. After the OTC senses them, the μP will address the HOP via the I^{2}C-bus, to start the drive [1].
3. Via the ‘SUP-ENABLE’ signal, the Main Supply is switched ‘on’ and will deliver the V_{BAT} to the Line deflection stage [2].
4. EHT generation is now started.
5. The OTC will un-blank the picture.
6. When you switch ‘off’ the set, this is done in a controlled way via the POR signal [3].

Note: Standby is not directly achieved via the Standby line of the microprocessor, but indirectly via the HOP circuitry.

5.8.3 ComPair

This chassis does not have an IR transmitting LED (as in MG-sets). Therefore, a ‘Service’ (ComPair) connector is implemented at the rear side of the set, which is directly accessible (as in A10-, EM2E- and EM3E-sets). In addition to this, there is also a blinking LED procedure to show the contents of the error buffer.

When you use ComPair, you have the possibility to activate a ‘stepwise start-up’ mode. With this mode, you can initiate the start-up sequence step by step. This also means that in certain steps, some protections are not activated. This is sometimes very convenient during repair (see also paragraph 5.4.3).

5.8.4 Protections

There are ‘service pads’ implemented on the SSB (items 9005 and 9006, outside the shielding), to force the set in SAM or SDM (see also figure: ‘SSB removal (part 3)’ in Chapter 4). This will overrule the processor-controlled protections, but not the hardware protections. This means, that the A/D-input protections (5 and 8 V) and the I^{2}C ‘not-acknowledging’ info of the feature box (FBX) and of the Tuner are overruled.
Caution: When doing this, the service technician must know what he is doing, as it could lead to damaging the set.

The ‘ARC’- and/or ‘BRIDGECOIL’ protection are hardly ever triggered, however:
When you suspect the ‘ARC’ protection, look for bad solder joints and smell. By interrupting resistor 3497, this protection is disabled (special attention needed!).
When you suspect the ‘BRIDGECOIL’ protection, which can also be due to a too wide picture amplitude, shorten G and S of the E/W MOSFET 7480. This will disable the protection. You will now have minimal horizontal amplitude. Re-align the horizontal amplitude in the SAM menu and remove the G/S short of TS7480.

5.8.5 Main Supply

The simplest way is, to replace the components of the Main Supply with repair kit (3122 785 90310)

More detailed way:
1. Replace FET 7504 and zener 6505.
2. Remove the SSB panel.
3. Short B and E of TS7529, in order to put the Main Supply in ‘on’-mode (TS7529 is blocking then). Caution: To prevent that R3403 and TS7443 will be damaged, first disable the HW-protection of the deflection circuit. Therefore short circuit C2642 on the LSP (diagram A4).
4. Attach a load of 500 Ω to V_{BAT} capacitor C2515 (the supply can not work without a minimum load).
5. Use a variac, and slowly increase the VMAINS. Measure over sensing resistors R3514//15 if a nice sawtooth voltage becomes available.
6. Also measure the V_{BAT}. This may never exceed +141 V. If it does, there is something wrong in the feedback circuitry (e.g. regulator 7506).

Note: Be careful when measuring on the gate of FET TS7504. This circuitry is very high ohmic and can easily be damaged (first connect ground to measuring equipment, than measure the gate).

5.8.6 Standby Supply

The simplest way is to replace the components of the Standby Supply with repair kit 3122 785 90460.

5.8.7 Line Deflection

The simplest way is to replace the components of the Line Deflection circuitry with repair kit 3122 785 90330.

5.8.8 Frame Deflection

Caution: When the Frame Deflection circuitry is suspected, one must be careful. Because there is a DC-voltage on the frame deflection, the beam current could damage the CRT neck, leading to a defective CRT.

- Best thing to do is:
- Interrupt the resistors 3403 and 3404 on the CRT panel (diagram F1), in order to remove the ‘filament’ voltage from the tube (no beam current, so no chance of destroying the CRT).
- Interrupt resistor 3403 on the LSP (diagram A4) to disable the ‘SUP-ENABLE’ line.
- Measure with a multi-meter, or better with a oscilloscope, the functionality of the Frame stage.
- After you have found the cause, exchange the defective component (e.g. TDA8177), and re-solder the interrupted resistors.

Table 5-4 Repair tips

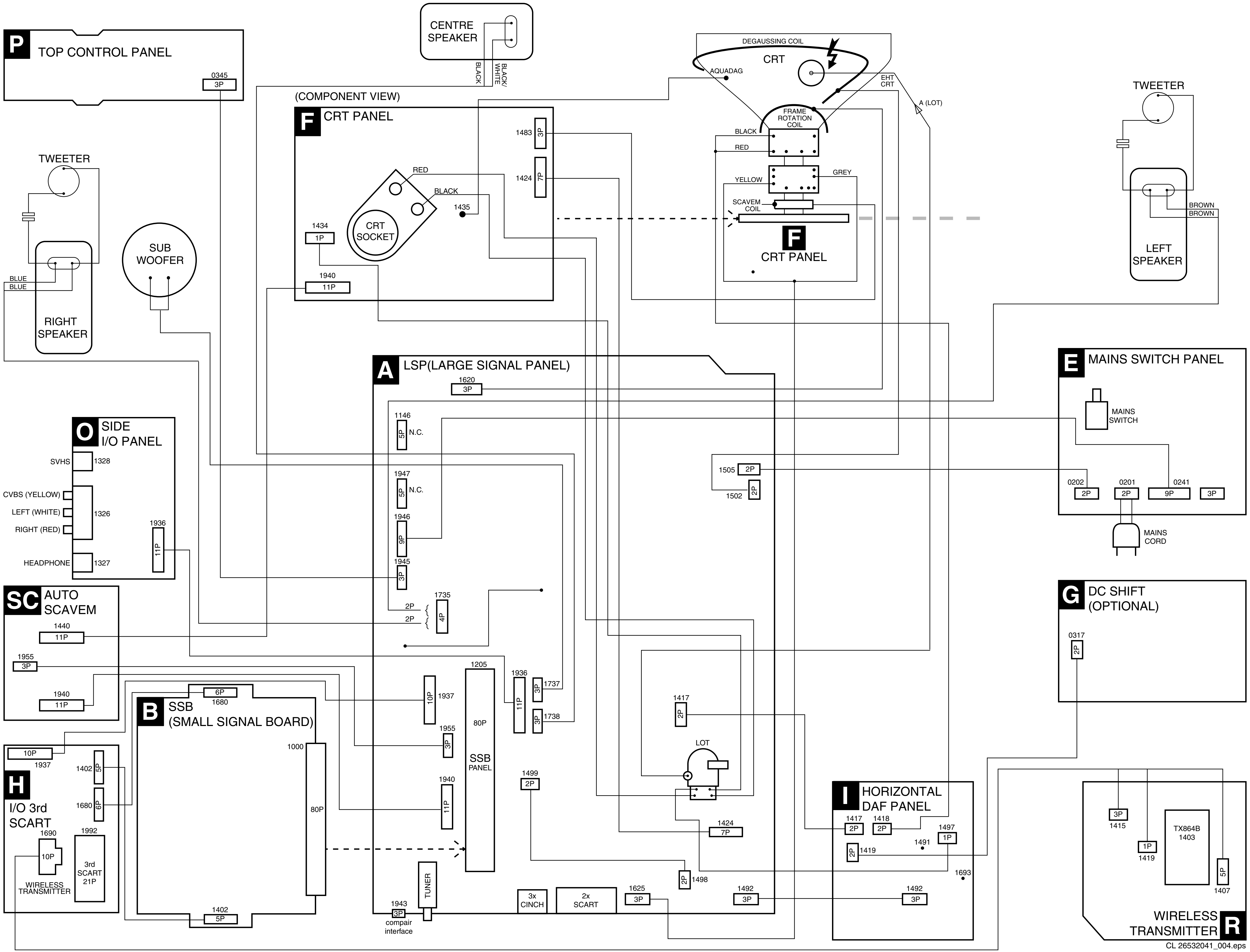
Phenomenon	Possible Cause	Repair tip
No picture, no LED.	Standby Supply defective.	Measure circuitry (see diagram A2). Start at test-point A19.When the Mains switch is 'on', this voltage must always be available
No picture, no LED.	Bad connection of SSB in SIMM-connector.	In case of a bad connection, it can happen that there is no picture, and that the Standby LED is not controllable. Re-place the SSB.
No picture, red LED blinking at 3 Hz.	Set is in protection due to various causes. For error codes see error-code list.	You have no picture, so: Read the error buffer via ComPair (error buffer is accessible when set is in protection, compare-file will guide you to this) Read the blinking LED information via standard remote command <mute>06250X<ok> Or you read the error code sequence via standard remote command <mute>062500<ok>. When you have found the error, check the circuitry related to the supply voltage and I^2C-communication or the circuitry that triggers the protection.
No picture, red LED blinking with code 6-6-6 or 18-18-18.	No communication on slow I^2C- or fast I^2C-bus.	As processor cannot communicate with one of the 2 busses it the standby-led spontaneously starts blinking 6-6-6 . . . or 18-18-18 . . .. If in the error buffer somewhere is an error 6 or 18, these will have the highest priority starting the mentioned blinking. Measure dependent of the error on the I^2C-bus which device is loading the bus. (Use I^2C -overview)
No picture, red LED blinking with code 1-1-1.	No communication on NVM-I^2C bus to the µP.	As the µP cannot communicate with the NVM I^2C bus, it spontaneously starts blinking 1-1-1. Note: when there is no access to the NVM, a lot of picture setting can go wrong.
No picture, no sound. Set is making audible squeaking sound	Supply is possibly in hiccup-mode, which is audible via a squeaking supply transformer.	Possible causes: V_{BAT} is shorted (caused by short circuited line transistor 7421), or Sound winding is shorted (amplifier is shortening the power supply lines), or D6514 is shorted (due to a too high V_{BAT}). Remove excessive load, to see what causes the failure, or check feedback circuit. See repair tip 'Main Power Supply' (supply needs a minimal load).
No picture, no sound. Green LED works fine	Supply does not work correctly.	If e.g. V_{BAT} is only about 90 V, it is possible that the regulator IC (7506) is defective.
No RC-reception. Red LED does not echo RC-commands.	µP circuitry or RC-receiver is defective.	In case the set does react on a local keyboard operation, you must check the RC-receiver circuitry (diagram E).
Relay (degaussing) is not audible, when set is switched from 'off' or 'standby' to 'on'.	µP is not working correctly.When pin 115 is low, the degaussing must be activated.	Check RESET-circuitry on diagram B5. Check the level on pin 115 when you switch the set 'on'. Signal must be low initially and go to high after approx. 12 µs.
No sound, only picture.	Measure A7/A8 on diagram A1. Possibly the audio amplifier is defect (but not shorted), or the 'sound enable' line is high (diagram A5). Further, measure the audio signal path (HIP-MSP-Switch ICs-Amplifier).	In ComPair, a beep test can determine where the signal stops (use loudspeakers or headphone).Possible cause is also the 'PROT1' protection (see diagram. A6). This is a loudspeaker DC protection, which the µP cannot sense. Via circuitry 7701/7707, this signal can put audio amplifiers 7700 and 7702 in standby mode (tri-state input). Warning: Find out, which amplifier is causing the problem, because it is possible, that the other one is OK.

Phenomenon	Possible Cause	Repair tip
No sound at headphone output.	HP amplifier (7681) on diagram B10, or the supply to it, malfunctions.	Measure on pin 3 input left and pin 1 output left, repeat this for pin 3 (input right) and pin 7 (output right), and the supply line (+8V_AUD) on diagram B10.
Picture is rotated.	Rotation circuitry on diagram A5, or related supply to it, malfunctions.	Measure test points A52 and A53 on diagram A5.
Picture is continuously switching 'off' and 'on', showing heavy 'switch' spots (set does not go into protection).	200 V is missing on CRT panel.	Probably a bad connection from LSP connector 1424 to CRT connector 1224 (diagram F1), or an interruption of the 200 V supplies line (e.g. R3341 on circuit F1 is interrupted).
Picture is not sharp.	Focus is possibly mis-aligned or SCAVEM-circuitry does not work correctly.	Re-align the 'focus' potmeter on the Line Output Transformer, or check the SCAVEM circuitry on the CRT-panel (diagram F2). It is also possible that the DAF circuitry is defective (see diagram I). Check the Vdc values.
Picture is not synchronised.	The sync is derived in the HIP from xtal 1305 and/or 1308.	Maybe the crystals 1305 and/or 1308 are making a bad contact.
Picture is distorted.	Check video-path in Service Default Mode.	Investigate whether there is an error code present in the error buffer. In case there is one, check the I^2C-bus and/or supply lines (see overview supply lines).Measure and check signal path Tuner-HIP-PICNIC-HOP-RGB amplifier.In case it is a geometry issue, check on diagram A4 opto-coupler 7482, OpAmps 7440/7450 and the Frame circuitry alignments or a possible corrupted NVM (7011) on diagram B5.
Picture with horizontal stripes.	Pixel Plus processing is malfunctioning	Check functionality on circuitry (B3a, B3b, and B3c) of PICNIC (7713), FALCONIC (7718, EAGLE (7724) and/or field memories (7714, 7717, 7719, 7722 and 7723.Tip the whole Pixel Plus chipset (3 ICs + 5 Field Memories can be diagnosed very good via ComPair.
No menu, no OSD.	Probably a defective µP.	Measure test points B61to B64 on diagram B5.
No NextView (EPG).	IC7012 defective or not powered.	Check circuitry around IC7012.
No Teletext.	IC7007 defective or not powered.	Check circuitry around IC7007. Check also B61to B64 around µP on diagram B5.
Strange switch 'off' behaviour	TS7445 possibly defective.	Check, with a multi-meter, whether transistor TS7445 is well functioning. (diagram A3).
Various symptoms, due to missing local supply voltage.	An interrupted fuse, NFR-resistor or connection.	When no symptom or error code leads you to a specific circuitry, use the supply lines overview (see chapter 6), for a quick scan of all supply lines.

Personal Notes:

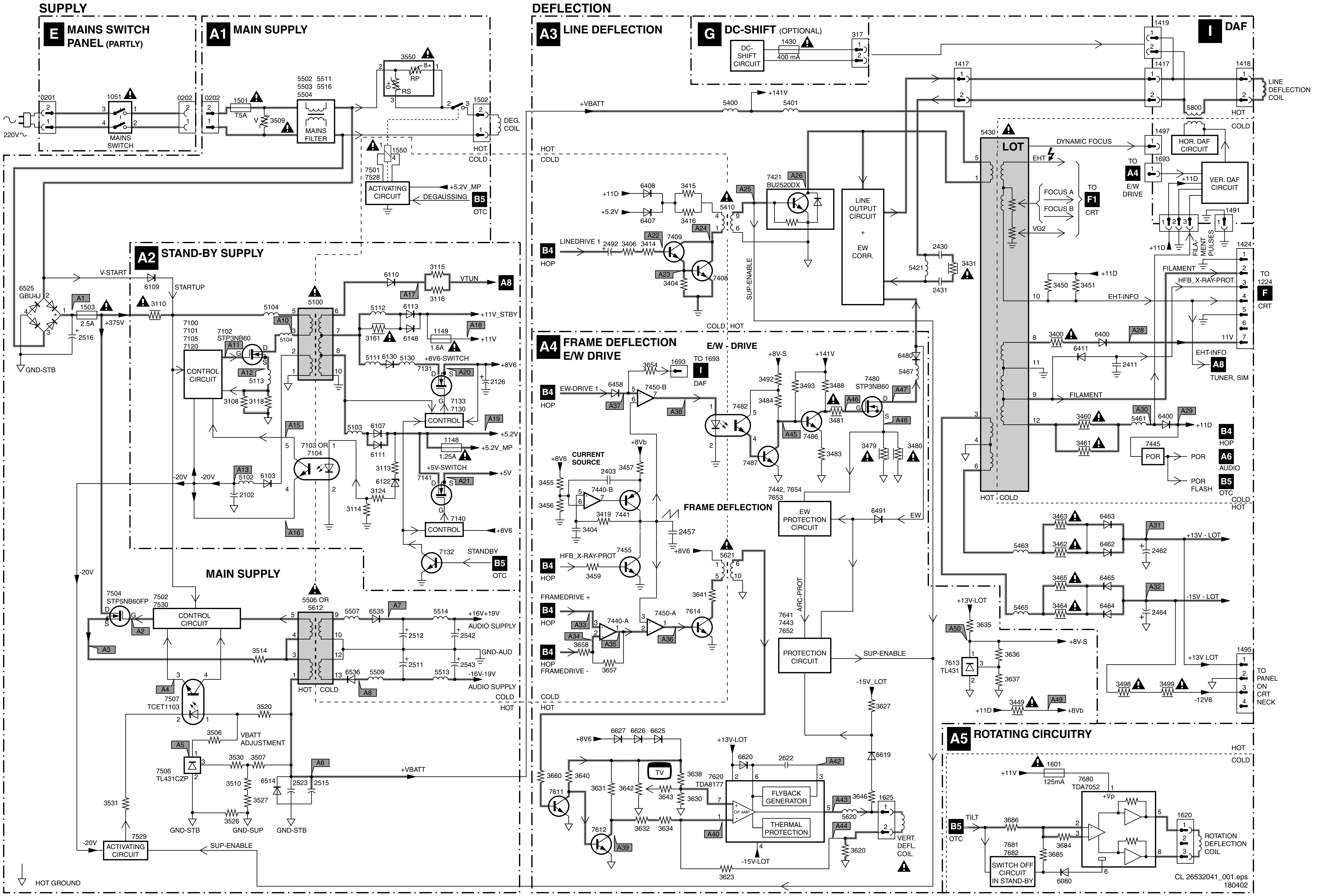
6. Wiring Diagram, Block Diagrams and Overviews

Wiring Diagram


P
TOP CONTROL PANEL
0345
3P
CENTRE SPEAKER
BLACK
BLACK/WHITE
(COMPONENT VIEW)
F
CRT PANEL
1483
3P
1424
7P
RED
BLACK
1435
CRT SOCKET
1434
1P
1940
11P
DEGAUSSING COIL
CRT
AQUADAG
EHT CRT
A (LOT)
FRAME ROTATION COIL
BLACK
RED
YELLOW
GREY
SCAVEM COIL
F
CRT PANEL
TWEETER
LEFT SPEAKER
BROWN
BROWN
TWEETER
RIGHT SPEAKER
BLUE
BLUE
SUB WOOFER
A
LSP(LARGE SIGNAL PANEL)
1620
3P
1146
5P
N.C.
1947
5P
N.C.
1946
9P
1945
3P
1735
2P
2P
4P
1505
2P
1502
2P
O
SIDE I/O PANEL
SVHS
1328
CVBS (YELLOW)
LEFT (WHITE)
RIGHT (RED)
1326
1936
11P
HEADPHONE
1327
SC
AUTO SCAVEM
1440
11P
1955
3P
1940
11P
B
SSB (SMALL SIGNAL BOARD)
6P
1680
1000
80P
1402
5P
1205
80P
SSB PANEL
1937
10P
1955
3P
1940
11P
1936
11P
1737
3P
1738
3P
1499
2P
TUNER
1943
3P
compair interface
3x CINCH
2x SCART
1625
3P
1492
3P
1417
2P
LOT
1424
7P
2P
1498
H
I/O 3rd SCART
10P
1937
1402
5P
1680
6P
1690
10P
1992
3rd SCART 21P
WIRELESS TRANSMITTER
E
MAINS SWITCH PANEL
MAINS SWITCH
0202
2P
0201
2P
0241
9P
3P
MAINS CORD
G
DC SHIFT (OPTIONAL)
0317
2P
I
HORIZONTAL DAF PANEL
1417
2P
1418
2P
1497
1P
1491
2P
1419
1693
1492
3P
3P
1415
1P
1419
TX864B 1403
5P
1407
WIRELESS TRANSMITTER
R

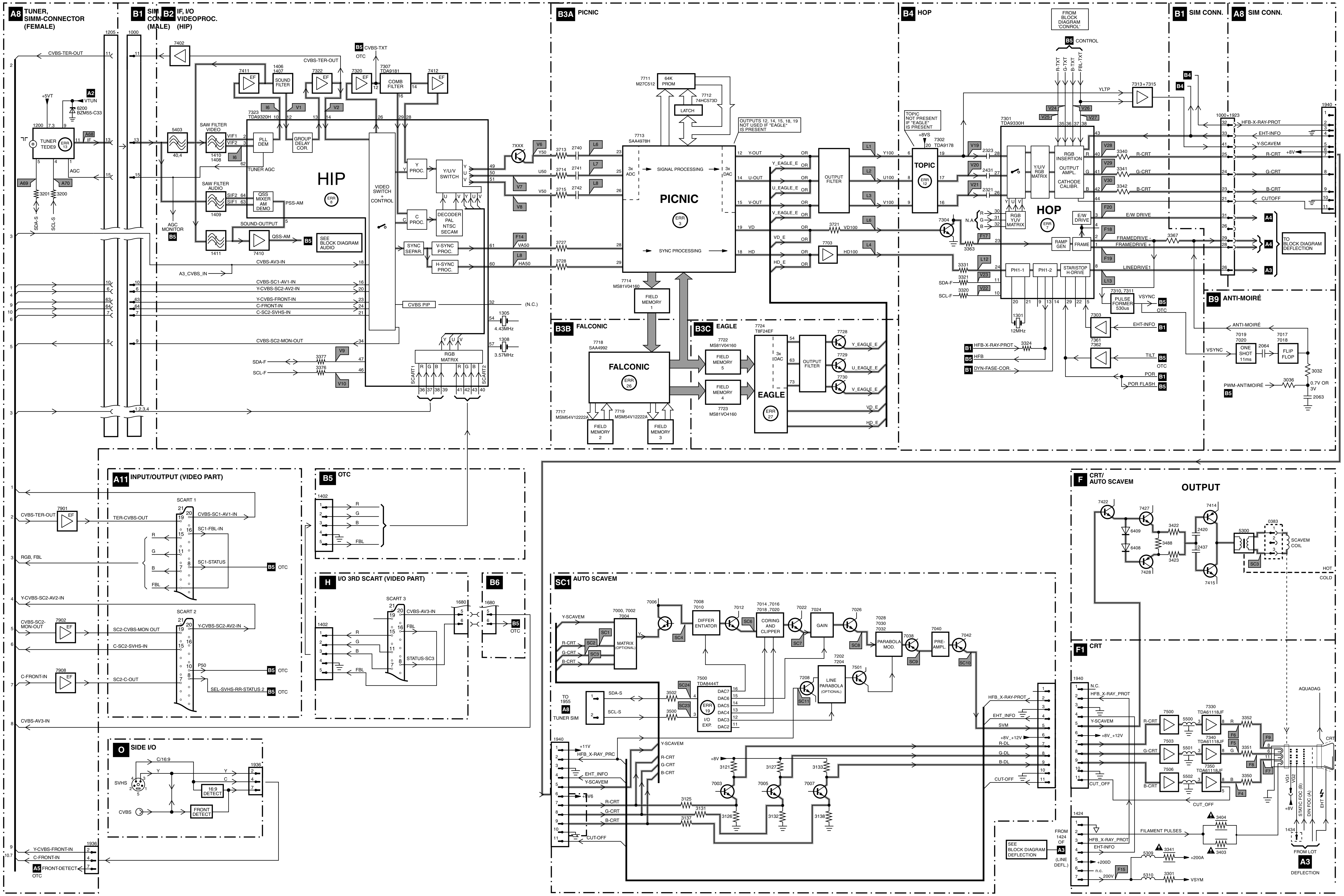
CL 26532041_004.eps
220402

Block Diagram Supply and Deflection


SUPPLY
DEFLECTION
E MAINS SWITCH PANEL (PARTLY)
A1 MAIN SUPPLY
A2 STAND-BY SUPPLY
MAIN SUPPLY
A3 LINE DEFLECTION
G DC-SHIFT (OPTIONAL)
I DAF
A4 FRAME DEFLECTION E/W DRIVE
E/W - DRIVE
FRAME DEFLECTION
A5 ROTATING CIRCUITRY
220V~
MAINS SWITCH
MAINS FILTER
T5A
DEG. COIL
HOT
COLD
ACTIVATING CIRCUIT
DEGAUSSING
+5.2V_MP
B5 OTC
6525 GBU4J
V-START
STARTUP
+375V
GND-STB
CONTROL CIRCUIT
7102 STP3NB60
VTUN
A8
+11V_STBY
+11V
+8V6-SWITCH
+8V6
CONTROL
+5.2V
+5.2V_MP
+5V-SWITCH
+5V
STANDBY
-20V
7504 STP5NB60FP
5506 OR 5612
+16V+19V AUDIO SUPPLY
GND-AUD
-16V-19V AUDIO SUPPLY
7507 TCET1103
VBATT ADJUSTMENT
7506 TL431CZP
+VBATT
GND-SUP
SUP-ENABLE
HOT GROUND
DC-SHIFT CIRCUIT
400 mA
+141V
7421 BU2520DX
LINE OUTPUT CIRCUIT + EW CORR.
LINEDRIVE
B4 HOP
SUP-ENABLE
LOT
DYNAMIC FOCUS
EHT
FOCUS A
FOCUS B
VG2
TO F1 CRT
TO A4 E/W DRIVE
HOR. DAF CIRCUIT
VER. DAF CIRCUIT
FILA-MENT PULSES
FILAMENT
HFB_X-RAY-PROT.
EHT-INFO
TO 1224 F CRT
LINE DEFLECTION COIL
EHT-INFO A8 TUNER, SIM
POR
A6 AUDIO
POR FLASH
B5 OTC
+13V - LOT
-15V - LOT
EW-DRIVE
TO 1693 I DAF
CURRENT SOURCE
HFB_X-RAY-PROT
FRAMEDRIVE +
FRAMEDRIVE -
7480 STP3NB60
EW PROTECTION CIRCUIT
ARC-PROT
PROTECTION CIRCUIT
EW
+13V-LOT
+8V-S
7613 TL431
+11D
+8Vb
+13V LOT
-12V8
TO PANEL ON CRT NECK
7620 TDA8177
FLYBACK GENERATOR
THERMAL PROTECTION
OP AMP
TV
VERT. DEFL. COIL
-15V-LOT
1601 125mA
7680 TDA7052
TILT
SWITCH OFF CIRCUIT IN STAND-BY
ROTATION DEFLECTION COIL
CL 26532041_001.eps
180402

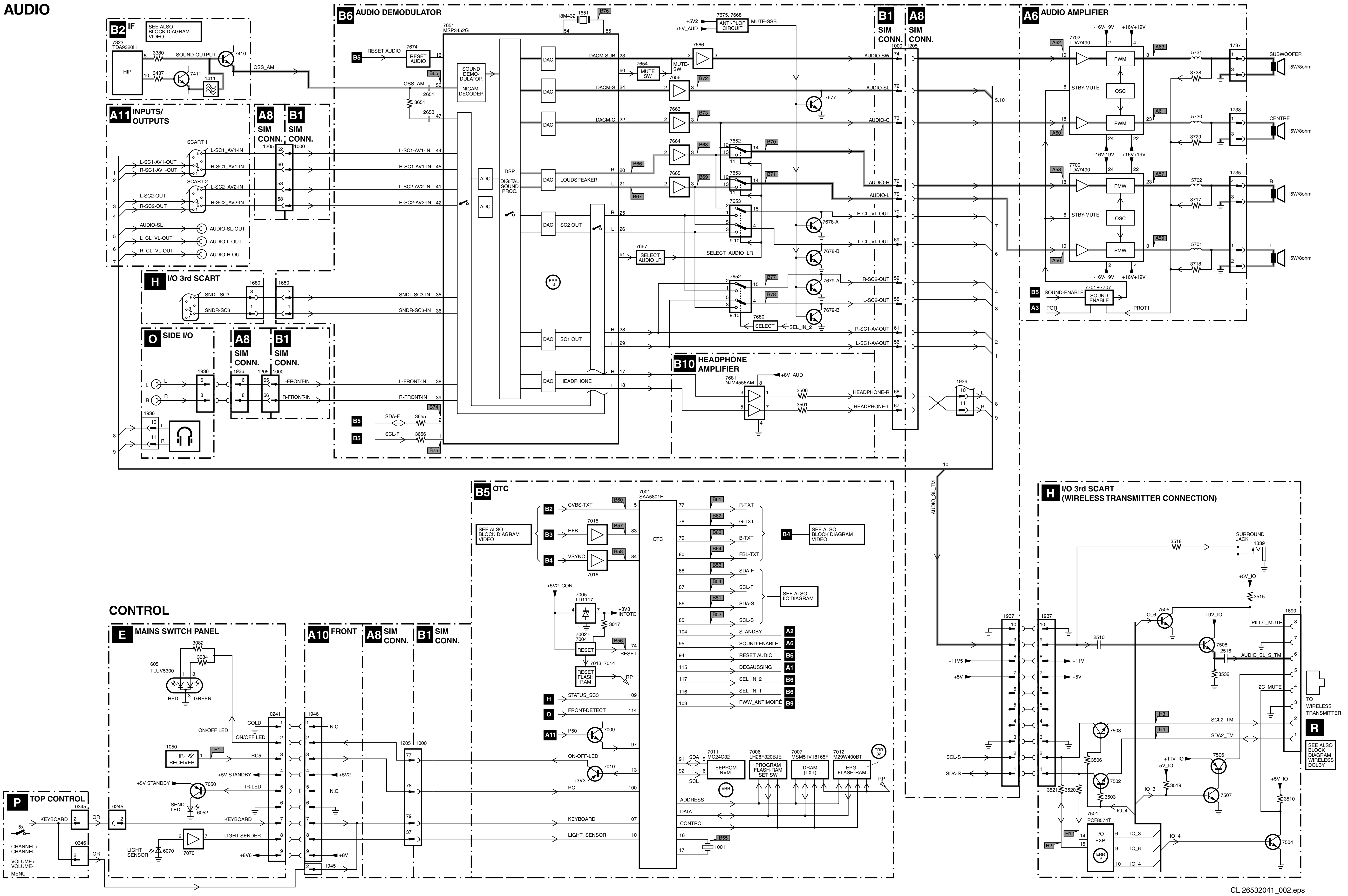
Block Diagram Video

VIDEO


A8 TUNER, SIMM-CONNECTOR (FEMALE)
B1 SIMM CONN. (MALE)
B2 IF, I/O VIDEOPROC. (HIP)
TUNER TEDE9
HIP
SAW FILTER VIDEO
SAW FILTER AUDIO
PLL DEM
QSS MIXER AM DEMO
GROUP DELAY COR.
SOUND FILTER
COMB FILTER
VIDEO SWITCH + CONTROL
Y PROC.
C PROC.
Y/U/V SWITCH
DECODER PAL NTSC SECAM
SYNC SEPAR.
V-SYNC PROC.
H-SYNC PROC.
RGB MATRIX
CVBS PIP
SEE BLOCK DIAGRAM AUDIO
B3A PICNIC
PICNIC
64K PROM
LATCH
SIGNAL PROCESSING
SYNC PROCESSING
3x ADC
3x DAC
OUTPUTS 12, 14, 15, 18, 19 NOT USED IF "EAGLE" IS PRESENT
OUTPUT FILTER
FIELD MEMORY 1
B3B FALCONIC
FALCONIC
FIELD MEMORY 2
FIELD MEMORY 3
B3C EAGLE
EAGLE
FIELD MEMORY 5
FIELD MEMORY 4
OUTPUT FILTER
B4 HOP
TOPIC
TOPIC NOT PRESENT IF "EAGLE" IS PRESENT
HOP
RGB INSERTION
OUTPUT AMPL.
CATHODE CALIBR.
Y/U/V RGB MATRIX
RGB YUV MATRIX
E/W DRIVE
RAMP GEN
FRAME
PH1-1
PH1-2
STARISTOP H-DRIVE
PULSE FORMER 530us
FROM BLOCK DIAGRAM 'CONROL'
B5 CONTROL
B1 SIM CONN.
A8 SIM CONN.
TO BLOCK DIAGRAM DEFLECTION
B9 ANTI-MOIRÉ
ONE SHOT 11ms
FLIP FLOP
A11 INPUT/OUTPUT (VIDEO PART)
SCART 1
SCART 2
B5 OTC
H I/O 3RD SCART (VIDEO PART)
SCART 3
B6
O SIDE I/O
16:9 DETECT
FRONT DETECT
SC1 AUTO SCAVEM
MATRIX (OPTIONAL)
DIFFER ENTIATOR
CORING AND CLIPPER
GAIN
PARABOLA MOD.
PRE-AMPL.
LINE PARABOLA (OPTIONAL)
I/O EXP.
F CRT/ AUTO SCAVEM
OUTPUT
SCAVEM COIL
F1 CRT
SEE BLOCK DIAGRAM DEFLECTION
FROM LOT
A3 DEFLECTION
AQUADAG
CRT

CL 26532041_003.eps
190402

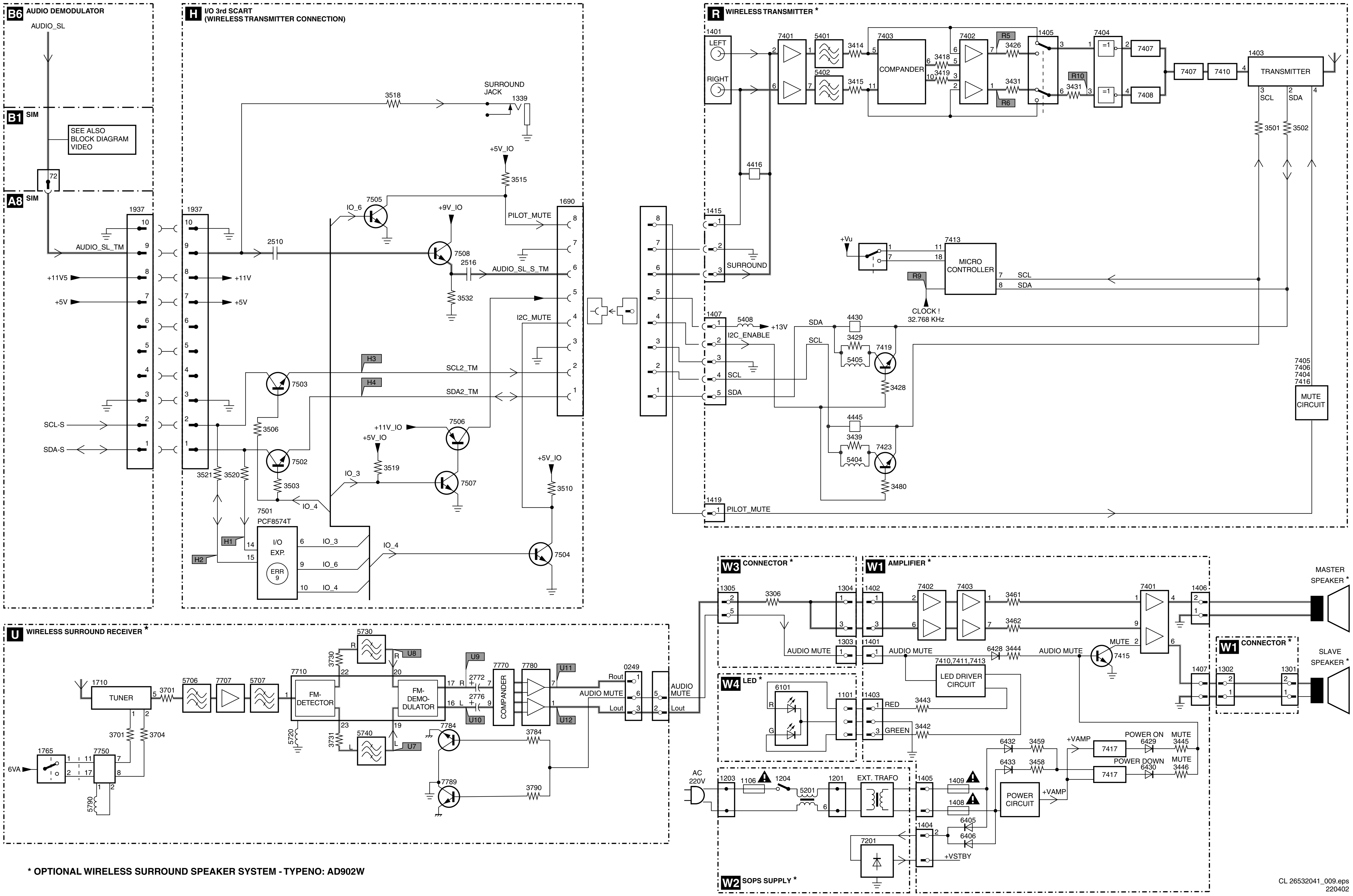
Block Diagram Audio 1 (Exclusive Wireless Audio Details)


AUDIO
B2 IF
SEE ALSO BLOCK DIAGRAM VIDEO
7323 TDA9320H
HIP
SOUND-OUTPUT
QSS_AM
A11 INPUTS/ OUTPUTS
A8 SIM CONN.
B1 SIM CONN.
SCART 1
L-SC1_AV1-IN
R-SC1_AV1-IN
L-SC1-AV1-OUT
R-SC1-AV1-OUT
SCART 2
L-SC2_AV2-IN
R-SC2_AV2-IN
L-SC2-OUT
R-SC2-OUT
AUDIO-SL
AUDIO-SL-OUT
L_CL_VL-OUT
AUDIO-L-OUT
R_CL_VL-OUT
AUDIO-R-OUT
H I/O 3rd SCART
SNDL-SC3
SNDR-SC3
O SIDE I/O
L-FRONT-IN
R-FRONT-IN
B6 AUDIO DEMODULATOR
7651 MSP3452G
RESET AUDIO
SOUND DEMO-DULATOR
NICAM-DECODER
ADC
DSP DIGITAL SOUND PROC.
DAC
DACM-SUB
DACM-S
DACM-C
LOUDSPEAKER
SC2 OUT
SC1 OUT
HEADPHONE
SDA-F
SCL-F
ANTI-PLOP CIRCUIT
MUTE-SSB
MUTE SW
SELECT AUDIO LR
SELECT_AUDIO_LR
SELECT
SEL_IN_2
B10 HEADPHONE AMPLIFIER
7681 NJM4556AM
HEADPHONE-R
HEADPHONE-L
AUDIO-SW
AUDIO-SL
AUDIO-C
AUDIO-R
AUDIO-L
R-CL_VL-OUT
L-CL_VL-OUT
R-SC2-OUT
L-SC2-OUT
R-SC1-AV-OUT
L-SC1-AV-OUT
A6 AUDIO AMPLIFIER
7702 TDA7490
7700 TDA7490
PWM
OSC
STBY-MUTE
SOUND-ENABLE
SOUND ENABLE
POR
PROT1
SUBWOOFER 15W/8ohm
CENTRE 15W/8ohm
R 15W/8ohm
L 15W/8ohm
B5 OTC
7001 SAA5801H
OTC
SEE ALSO BLOCK DIAGRAM VIDEO
CVBS-TXT
HFB
VSYNC
R-TXT
G-TXT
B-TXT
FBL-TXT
SDA-F
SCL-F
SDA-S
SCL-S
SEE ALSO IIC DIAGRAM
STANDBY
SOUND-ENABLE
RESET AUDIO
DEGAUSSING
SEL_IN_2
SEL_IN_1
PWW_ANTIMOIRÉ
7005 LD1117
+3V3 INTOTO
RESET
RESET FLASH RAM
STATUS_SC3
FRONT-DETECT
ON-OFF-LED
RC
KEYBOARD
LIGHT_SENSOR
7011 MC24C32 EEPROM NVM.
7006 LH28F320BJE PROGRAM FLASH-RAM SET SW
7007 MSM51V18165F DRAM (TXT)
7012 M29W400BT EPG-FLASH-RAM
ADDRESS
DATA
CONTROL
H I/O 3rd SCART (WIRELESS TRANSMITTER CONNECTION)
SURROUND JACK
PILOT_MUTE
AUDIO_SL_S_TM
I2C_MUTE
SCL2_TM
SDA2_TM
TO WIRELESS TRANSMITTER
R SEE ALSO BLOCK DIAGRAM WIRELESS DOLBY
7501 PCF8574T I/O EXP.
AUDIO_SL_TM
CONTROL
E MAINS SWITCH PANEL
6051 TLUV5300
RED
GREEN
ON/OFF LED
IR-RECEIVER
+5V STANDBY
SEND LED
LIGHT SENSOR
KEYBOARD
LIGHT SENDER
A10 FRONT
A8 SIM CONN.
B1 SIM CONN.
P TOP CONTROL
CHANNEL+ CHANNEL-
VOLUME+ VOLUME-
MENU

CL 26532041_002.eps
190402

Block Diagram Audio 2 (Wireless Audio Details)

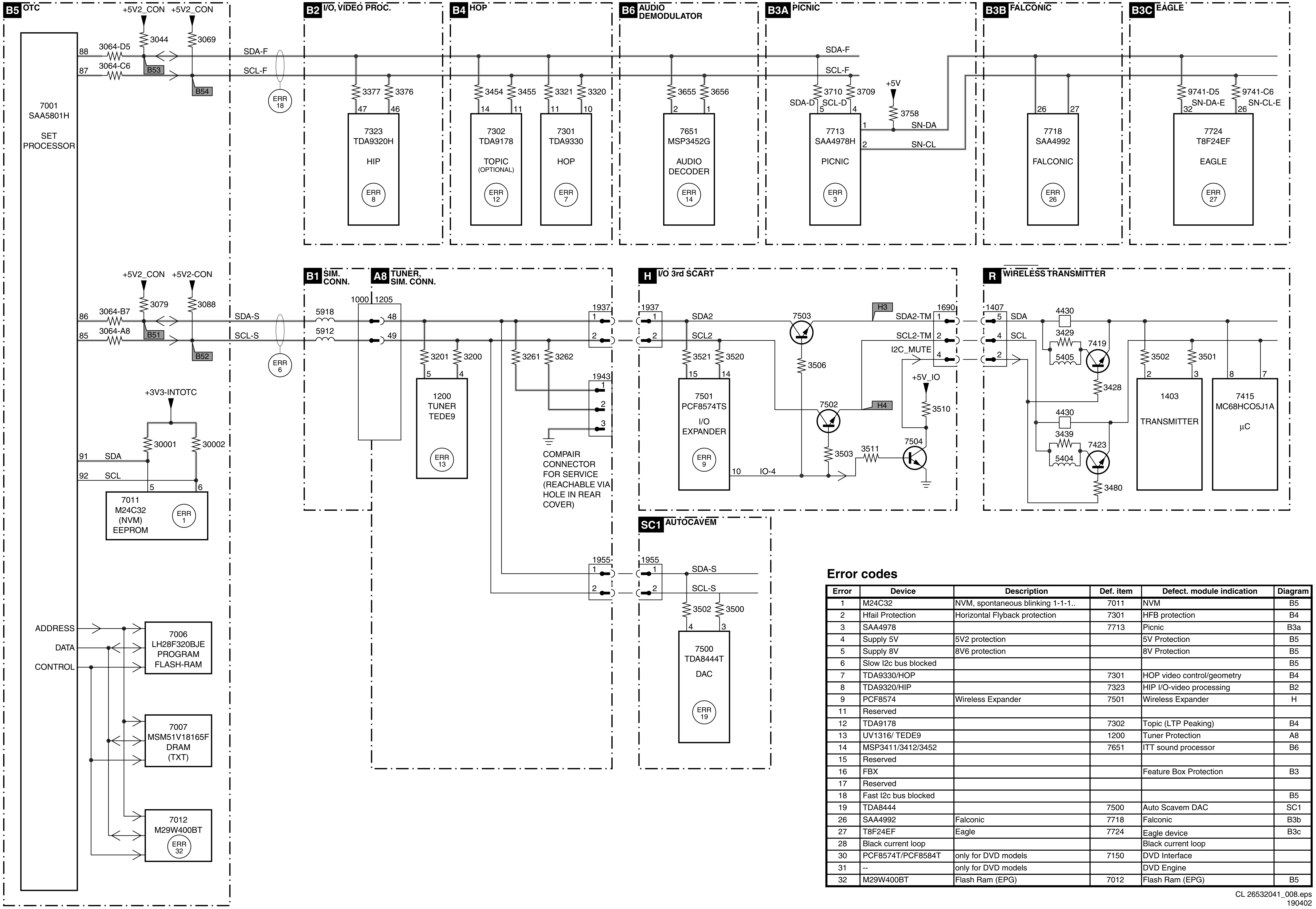
WIRELESS DOLBY


B6 AUDIO DEMODULATOR
AUDIO_SL
B1 SIM
SEE ALSO BLOCK DIAGRAM VIDEO
A8 SIM
1937
AUDIO_SL_TM
+11V5
+5V
SCL-S
SDA-S
H I/O 3rd SCART (WIRELESS TRANSMITTER CONNECTION)
3518
SURROUND JACK
1339
+5V_IO
3515
PILOT_MUTE
1690
IO_6
7505
+9V_IO
2510
7508
2516
AUDIO_SL_S_TM
3532
I2C_MUTE
+11V
H3
H4
SCL2_TM
SDA2_TM
7503
3506
7502
3503
3521
3520
+11V_IO
+5V_IO
7506
3519
IO_3
7507
3510
IO_4
7501
PCF8574T
H1
H2
I/O EXP.
ERR 9
IO_3
IO_6
IO_4
7504
R WIRELESS TRANSMITTER *
1401
LEFT
RIGHT
7401
5401
5402
3414
3415
7403
COMPANDER
3418
3419
7402
R5
3426
3431
R6
1405
R10
3431
7404
7407
7408
7407
7410
1403
TRANSMITTER
SCL
SDA
3501
3502
4416
1415
SURROUND
+Vu
7413
MICRO CONTROLLER
R9
CLOCK ! 32.768 KHz
SCL
SDA
1407
5408
+13V
I2C_ENABLE
SDA
SCL
4430
3429
5405
7419
3428
4445
3439
5404
7423
3480
7405 7406 7404 7416
MUTE CIRCUIT
1419
PILOT_MUTE
W3 CONNECTOR *
1305
3306
1304
1303
AUDIO MUTE
W1 AMPLIFIER *
1402
7402
7403
3461
3462
1401
AUDIO MUTE
6428
3444
7410,7411,7413
LED DRIVER CIRCUIT
AUDIO MUTE
MUTE
7415
7401
1406
MASTER SPEAKER *
SLAVE SPEAKER *
W1 CONNECTOR *
1407
1302
1301
W4 LED *
6101
1101
1403
RED
GREEN
3443
3442
6432
3459
6433
3458
+VAMP
7417
POWER ON
6429
MUTE
3445
POWER DOWN
6430
3446
AC 220V
1203
1106
1204
5201
1201
EXT. TRAFO
1405
1409
1408
POWER CIRCUIT
+VAMP
1404
6405
6406
7201
+VSTBY
W2 SOPS SUPPLY *
U WIRELESS SURROUND RECEIVER *
1710
TUNER
3701
3704
1765
6VA
7750
5790
5706
7707
5707
7710
5730
3730
U8
FM-DETECTOR
FM-DEMO-DULATOR
5720
3731
5740
U7
U9
2772
2776
7770
COMPANDER
7780
U10
U11
U12
7784
7789
3784
3790
0249
Rout
AUDIO MUTE
Lout
AUDIO MUTE
Lout
CL 26532041_009.eps
220402

* OPTIONAL WIRELESS SURROUND SPEAKER SYSTEM - TYPENO: AD902W

I2C IC's overview

IIC

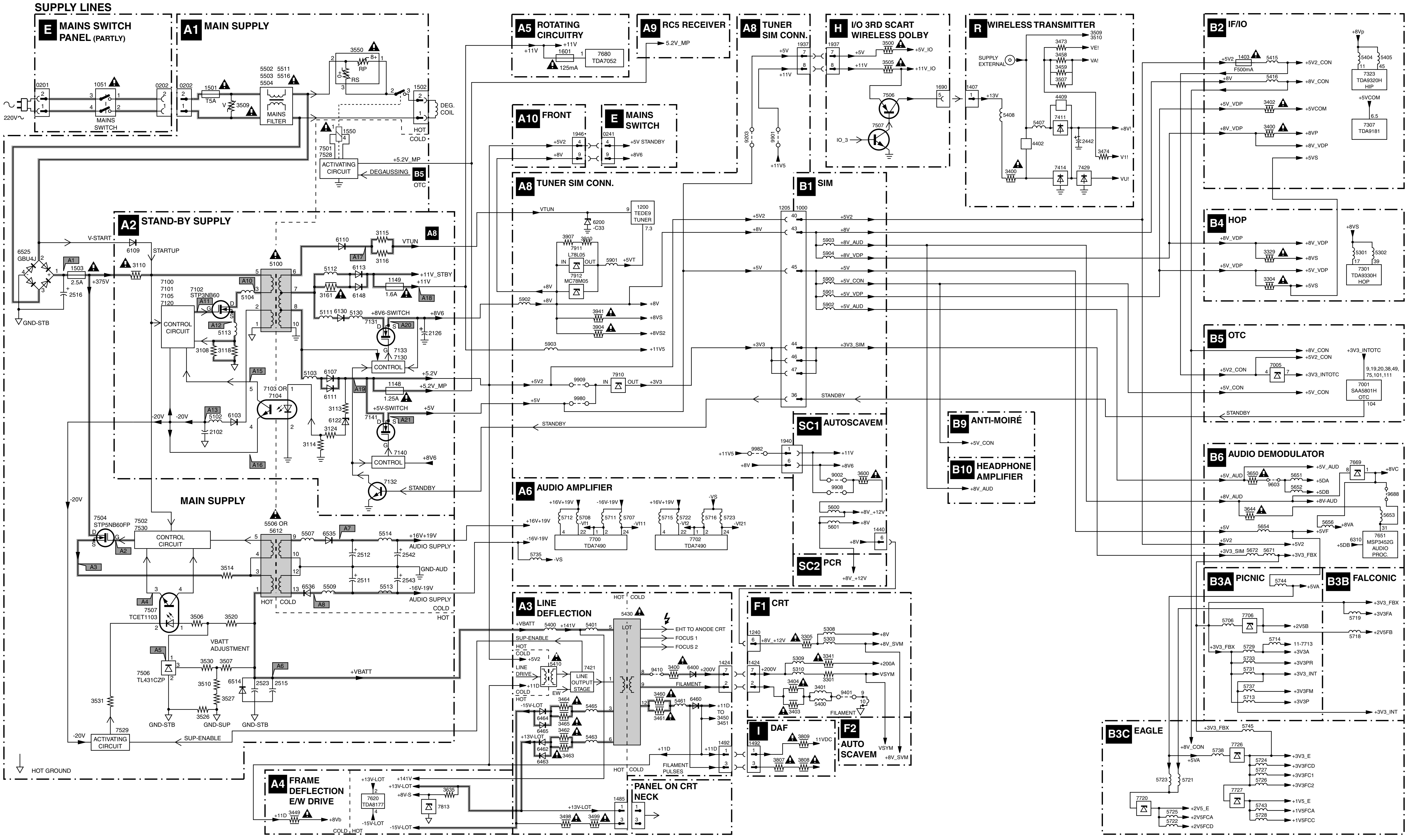

B5 OTC
7001
SAA5801H
SET PROCESSOR
+5V2_CON
3044
3069
3064-D5
3064-C6
88
87
B53
B54
SDA-F
SCL-F
ERR 18
+5V2_CON
+5V2-CON
3079
3088
3064-B7
3064-A8
86
85
B51
B52
SDA-S
SCL-S
ERR 6
+3V3-INTOTC
30001
30002
91 SDA
92 SCL
7011
M24C32
(NVM)
EEPROM
ERR 1
ADDRESS
DATA
CONTROL
7006
LH28F320BJE
PROGRAM
FLASH-RAM
7007
MSM51V18165F
DRAM
(TXT)
7012
M29W400BT
ERR 32
B2 I/O, VIDEO PROC.
3377
3376
7323
TDA9320H
HIP
ERR 8
B4 HOP
3454
3455
3321
3320
7302
TDA9178
TOPIC
(OPTIONAL)
ERR 12
7301
TDA9330
HOP
ERR 7
B6 AUDIO DEMODULATOR
3655
3656
7651
MSP3452G
AUDIO DECODER
ERR 14
B3A PICNIC
3710
3709
SDA-D
SCL-D
+5V
3758
SN-DA
SN-CL
7713
SAA4978H
PICNIC
ERR 3
B3B FALCONIC
7718
SAA4992
FALCONIC
ERR 26
B3C EAGLE
9741-D5
9741-C6
SN-DA-E
SN-CL-E
7724
T8F24EF
EAGLE
ERR 27
B1 SIM. CONN.
5918
5912
A8 TUNER, SIM. CONN.
1000
1205
3201
3200
1200
TUNER
TEDE9
ERR 13
3261
3262
1937
1943
COMPAIR CONNECTOR FOR SERVICE (REACHABLE VIA HOLE IN REAR COVER)
1955
H I/O 3rd SCART
SDA2
SCL2
3521
3520
7501
PCF8574TS
I/O EXPANDER
ERR 9
IO-4
7503
3506
7502
H3
H4
SDA2-TM
SCL2-TM
I2C_MUTE
1690
+5V_IO
3510
7504
3503
3511
SC1 AUTOCAVEM
SDA-S
SCL-S
3502
3500
7500
TDA8444T
DAC
ERR 19
R WIRELESS TRANSMITTER
1407
SDA
SCL
4430
3429
5405
7419
3428
3439
5404
7423
3480
3502
3501
1403
TRANSMITTER
7415
MC68HCO5J1A
µC

Error codes

Error	Device	Description	Def. item	Defect. module indication	Diagram
1	M24C32	NVM, spontaneous blinking 1-1-1..	7011	NVM	B5
2	Hfail Protection	Horizontal Flyback protection	7301	HFB protection	B4
3	SAA4978		7713	Picnic	B3a
4	Supply 5V	5V2 protection		5V Protection	B5
5	Supply 8V	8V6 protection		8V Protection	B5
6	Slow I2c bus blocked				B5
7	TDA9330/HOP		7301	HOP video control/geometry	B4
8	TDA9320/HIP		7323	HIP I/O-video processing	B2
9	PCF8574	Wireless Expander	7501	Wireless Expander	H
11	Reserved				
12	TDA9178		7302	Topic (LTP Peaking)	B4
13	UV1316/ TEDE9		1200	Tuner Protection	A8
14	MSP3411/3412/3452		7651	ITT sound processor	B6
15	Reserved				
16	FBX			Feature Box Protection	B3
17	Reserved				
18	Fast I2c bus blocked				B5
19	TDA8444		7500	Auto Scavem DAC	SC1
26	SAA4992	Falconic	7718	Falconic	B3b
27	T8F24EF	Eagle	7724	Eagle device	B3c
28	Black current loop			Black current loop	
30	PCF8574T/PCF8584T	only for DVD models	7150	DVD Interface	
31	--	only for DVD models		DVD Engine	
32	M29W400BT	Flash Ram (EPG)	7012	Flash Ram (EPG)	B5

CL 26532041_008.eps
190402

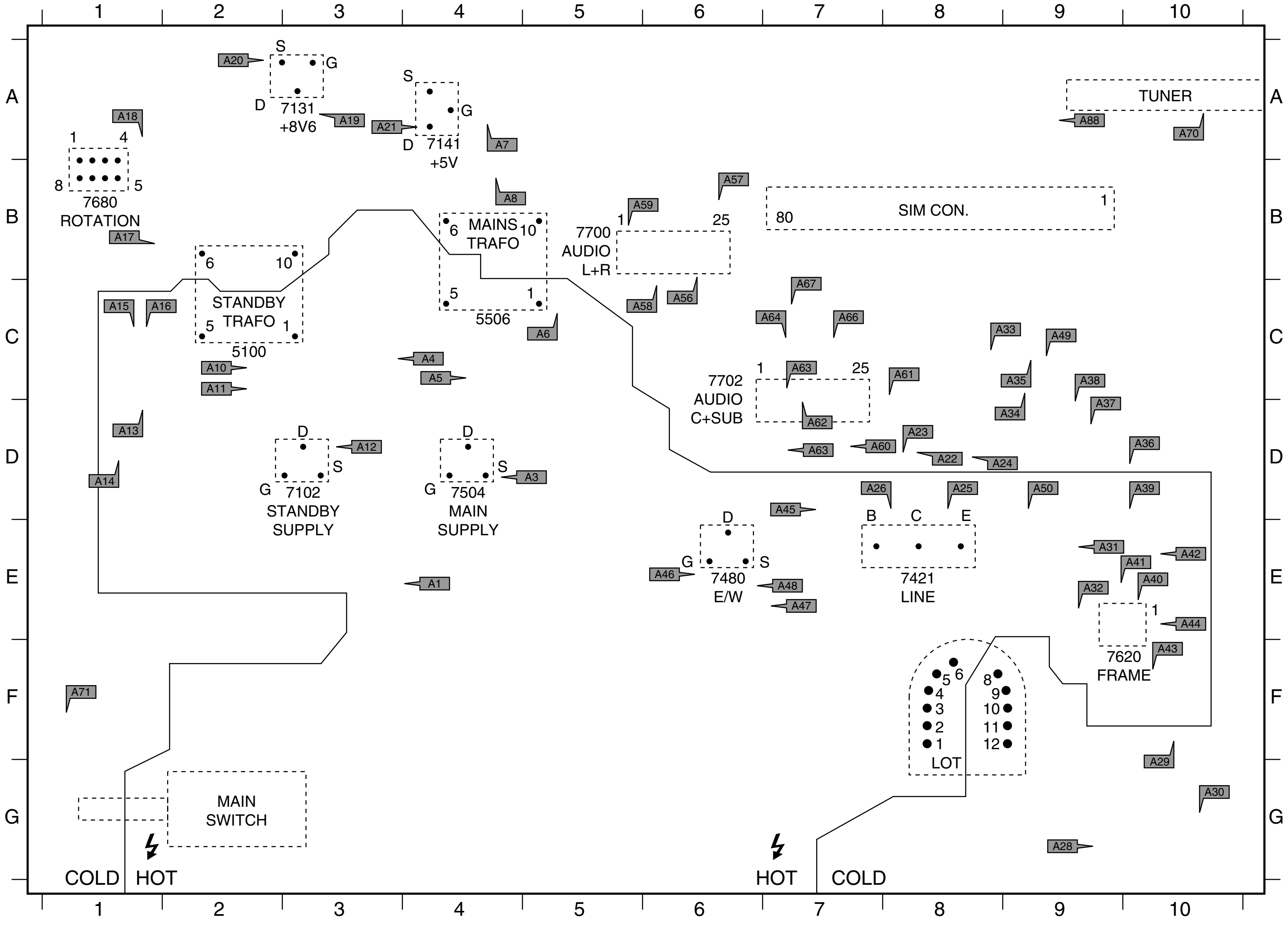
Supply Lines Overview


SUPPLY LINES
E MAINS SWITCH PANEL (PARTLY)
A1 MAIN SUPPLY
A5 ROTATING CIRCUITRY
A9 RC5 RECEIVER
A8 TUNER SIM CONN.
H I/O 3RD SCART WIRELESS DOLBY
R WIRELESS TRANSMITTER
B2 IF/IO
A10 FRONT
E MAINS SWITCH
A8 TUNER SIM CONN.
B1 SIM
B4 HOP
B5 OTC
A2 STAND-BY SUPPLY
MAIN SUPPLY
A6 AUDIO AMPLIFIER
SC1 AUTOSCAVEM
SC2 PCR
B9 ANTI-MOIRÉ
B10 HEADPHONE AMPLIFIER
B6 AUDIO DEMODULATOR
B3A PICNIC
B3B FALCONIC
A3 LINE DEFLECTION
F1 CRT
I DAF
F2 AUTO SCAVEM
B3C EAGLE
A4 FRAME DEFLECTION E/W DRIVE
PANEL ON CRT NECK
220V~
MAINS SWITCH
MAINS FILTER
DEG. COIL
HOT
COLD
ACTIVATING CIRCUIT
DEGAUSSING
+5.2V_MP
V-START
STARTUP
CONTROL CIRCUIT
GND-STB
VTUN
+11V_STBY
+11V
+8V6-SWITCH
+8V6
+5.2V
+5.2V_MP
+5V-SWITCH
+5V
STANDBY
CONTROL
+375V
-20V
VBATT ADJUSTMENT
GND-SUP
+VBATT
SUP-ENABLE
+16V+19V AUDIO SUPPLY
GND-AUD
-16V-19V AUDIO SUPPLY
HOT GROUND
EHT TO ANODE CRT
FOCUS 1
FOCUS 2
FILAMENT
LINE OUTPUT STAGE
LINE DRIVE
EW
TDA7052
TDA7490
TDA8177
TDA9320H HIP
TDA9181
TDA9330H HOP
SAA5801H OTC
MSP3452G AUDIO PROC.
TEDE9 TUNER
MC78M05
L78L05
TCET1103
TL431CZP
STP3NB60
STP5NB60FP
GBU4J
+5V2
+8V
+3V3
+5V_CON
+8V_CON
+5VCOM
+8VP
+8V_VDP
+5VS
+8VS
+5V2_CON
+3V3_INTOTC
+5VA
+5VF
+8VA
+5DA
+5DB
+8VC
+8V-AUD
+5V_AUD
+3V3_SIM
+3V3_FBX
+3V3FA
+2V5FB
+2V5B
+3V3A
+3V3PR
+3V3_INT
+3V3FM
+3V3P
+3V3_E
+3V3FCD
+3V3FC1
+3V3FC2
+1V5_E
+1V5FCA
+1V5FCC
+2V5_E
+2V5FCA
+2V5FCD
+8V_SVM
+200A
VSYM
+11D
+11VDC
+141V
+13V-LOT
-15V-LOT
+8Vb
+5V_IO
+11V_IO
+8V_+12V
SUPPLY EXTERNAL
VE!
VA!
V1!
VU!
+8V!

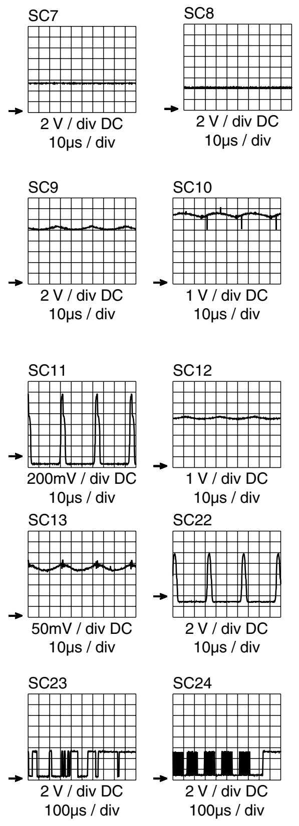
CL 26532041_007.eps
190402

Testpoint Overview LSP and CRT Panel

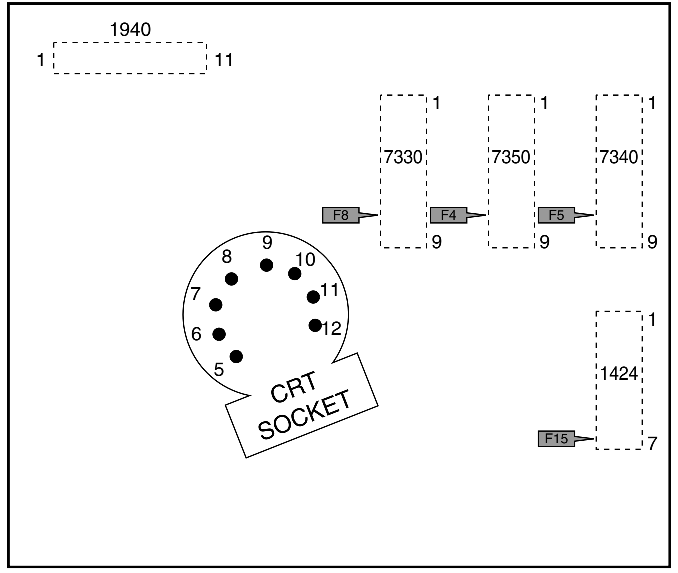
LSP COPPER TRACK SIDE


1 2 3 4 5 6 7 8 9 10
A B C D E F G
7131 +8V6
7141 +5V
TUNER
7680 ROTATION
MAINS TRAFO
7700 AUDIO L+R
SIM CON.
STANDBY TRAFO 5100
5506
7702 AUDIO C+SUB
7102 STANDBY SUPPLY
7504 MAIN SUPPLY
7480 E/W
7421 LINE
7620 FRAME
LOT
MAIN SWITCH
COLD HOT
HOT COLD

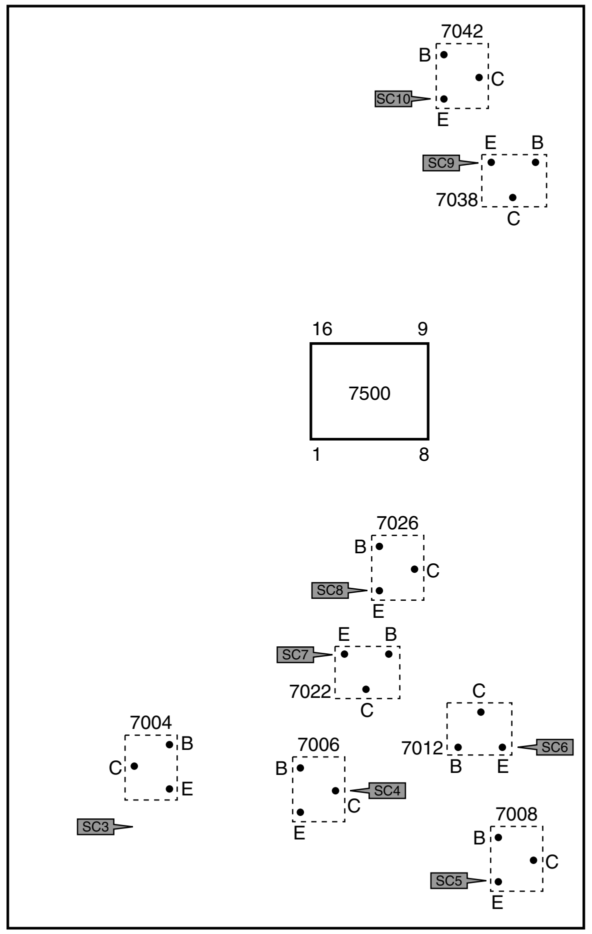
A1	E4	A58	C6
A3	D4	A59	B5
A4	C4	A60	D7
A5	C4	A61	C8
A6	C5	A62	D7
A7	A4	A63	D7
A8	B4	A64	C7
A10	C2	A66	C7
A11	C2	A67	C7
A12	D3	A70	A10
A13	D1	A71	F1
A14	D1	A88	A9
A15	C1		
A16	C1		
A17	B1		
A18	A1		
A19	A3		
A20	A2		
A21	A3		
A22	D8		
A23	D8		
A24	D8		
A25	D8		
A26	D7		
A28	G9		
A29	G10		
A30	G10		
A31	E9		
A32	E9		
A33	C8		
A34	D9		
A35	C9		
A36	D10		
A37	D9		
A38	C9		
A39	D10		
A40	E10		
A41	E10		
A42	E10		
A43	F10		
A44	E10		
A45	D7		
A46	E6		
A47	E7		
A48	E7		
A49	C9		
A50	D9		
A56	C6		
A57	B6		

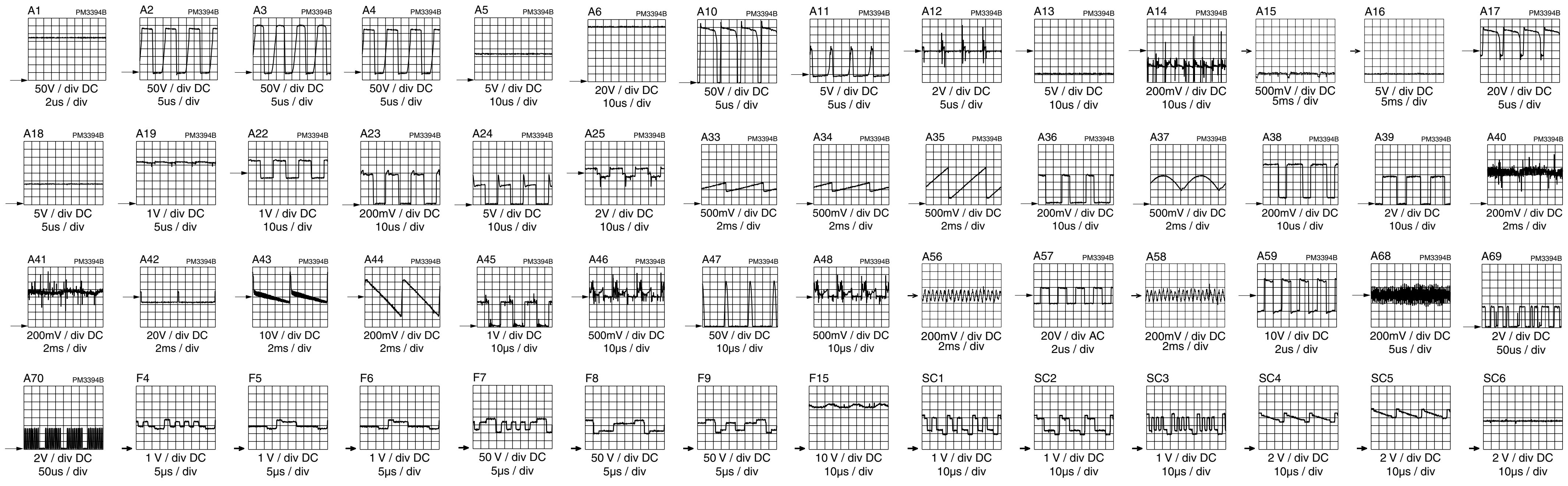


CRT PANEL (COPPER TRACK SIDE)


1940
7330
7350
7340
1424
F8 F4 F5 F15
CRT SOCKET

AUTO SCAVEM PANEL (COPPER TRACK SIDE)

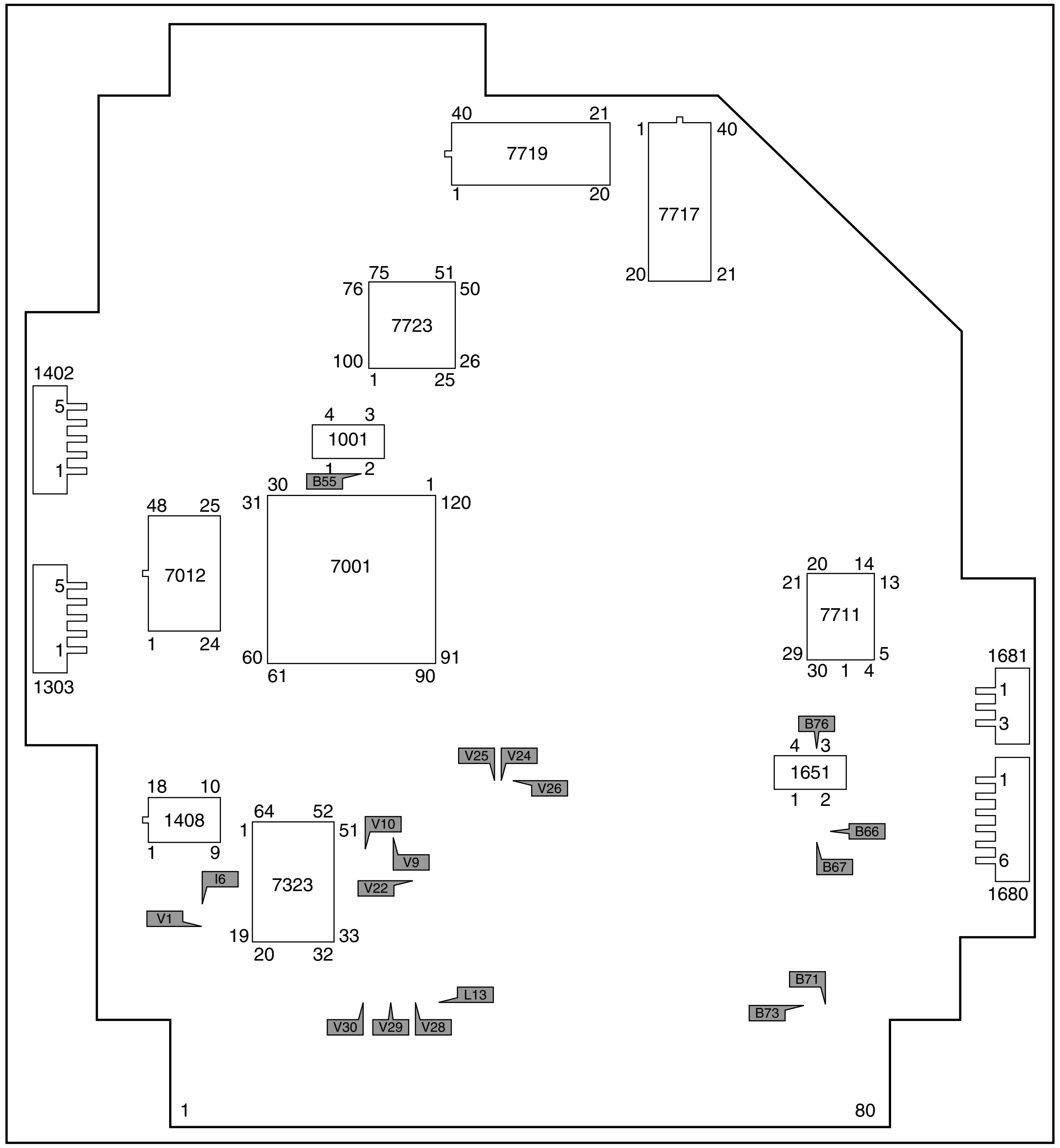

7042
7038
7500
7026
7022
7004
7006
7012
7008
SC10 SC9 SC8 SC7 SC6 SC4 SC3 SC5



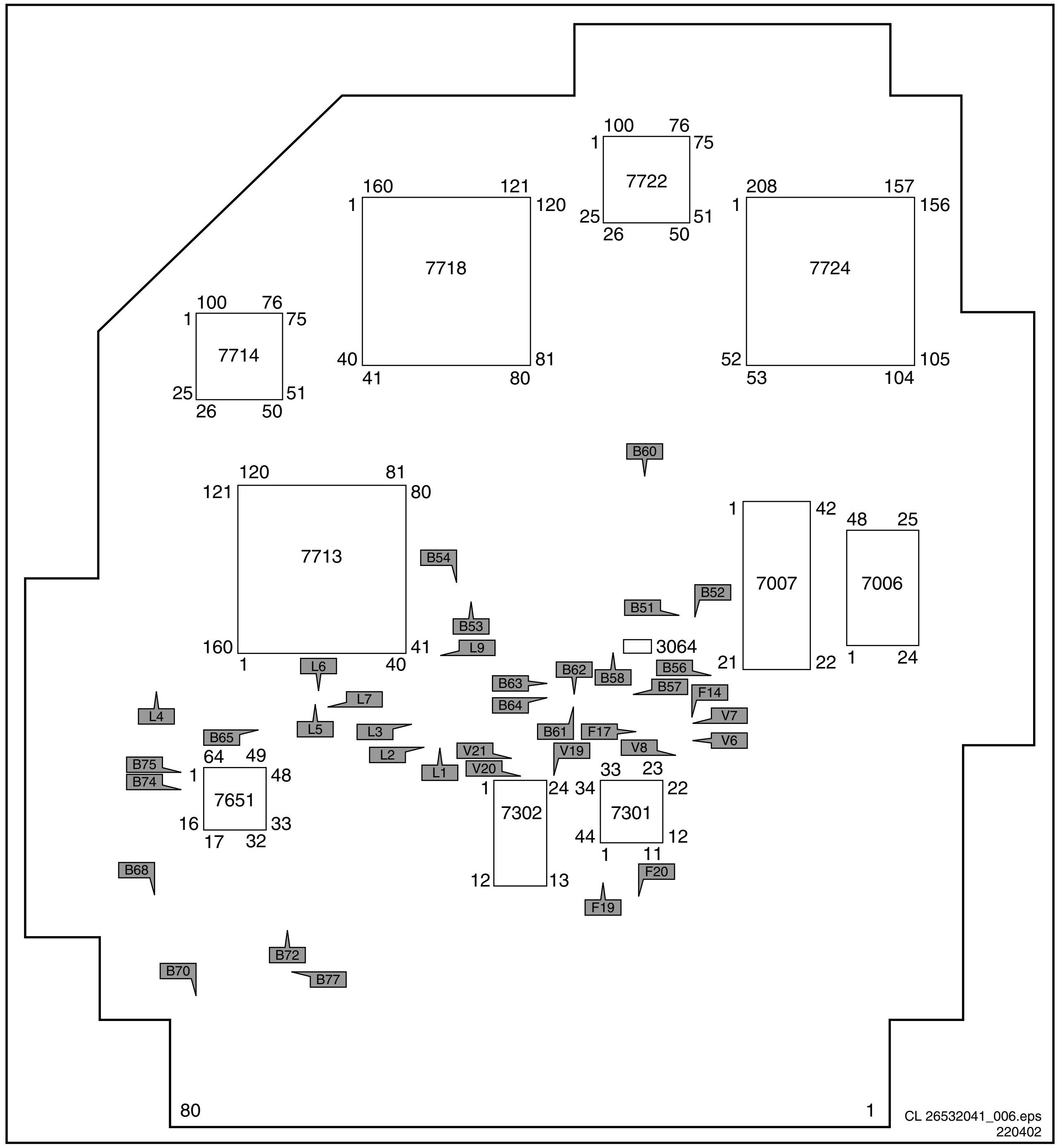
CL 26532041_005.eps
190402

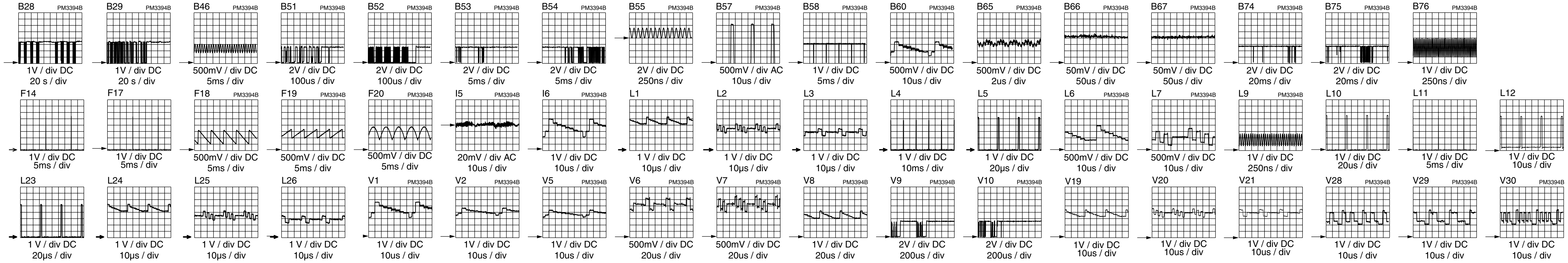
Testpoint Overview Small Signal Board

SSB SIDE A


7719
40
21
1
20
7717
1
40
20
21
7723
75
51
76
50
100
26
1
25
1402
5
1
1001
4
3
1
2
B55
30
1
7001
31
120
60
91
61
90
7012
48
25
1
24
1303
7711
20
14
21
13
29
5
30
1
4
1681
1
3
B76
4
3
1651
1
2
1680
6
1408
18
10
1
9
7323
64
52
1
51
19
33
20
32
V25
V24
V26
V10
V9
V22
I6
V1
B66
B67
B71
B73
L13
V30
V29
V28
1
80

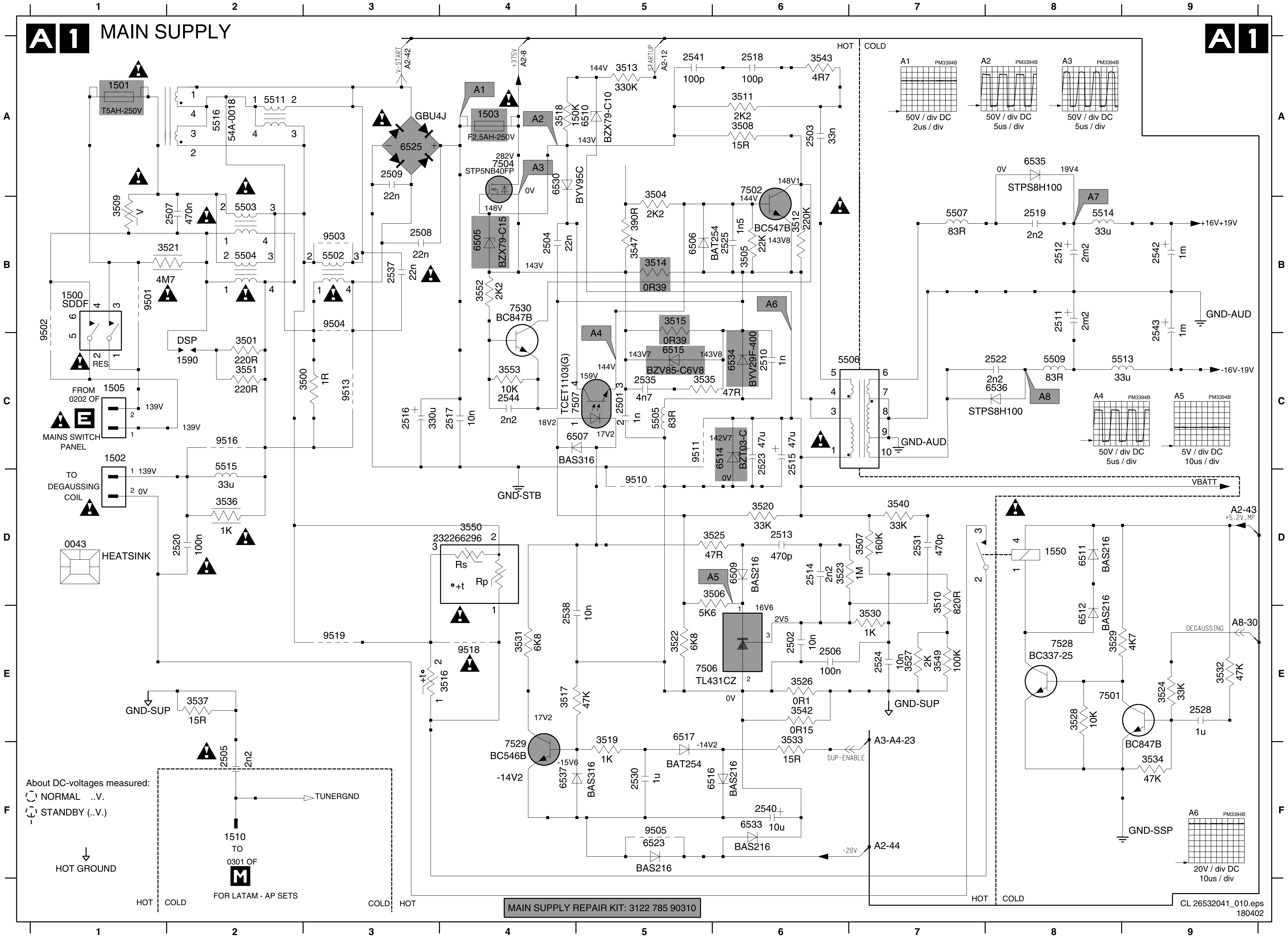
SSB SIDE Z


7722
100
76
1
75
25
51
26
50
7718
160
121
1
120
40
81
41
80
7724
208
157
1
156
52
105
53
104
7714
100
76
1
75
25
51
26
50
B60
7713
120
81
121
80
160
41
1
40
7007
1
42
21
22
7006
48
25
1
24
B54
B53
L9
B51
B52
3064
B62
B58
B56
B57
B63
B64
F14
V7
V6
B61
F17
V8
V19
V21
V20
L6
L7
L5
L3
L2
L1
L4
B65
B75
B74
7651
64
49
1
48
16
33
17
32
7302
1
24
12
13
7301
33
23
34
22
44
12
1
11
F20
F19
B68
B70
B72
B77
80
1
CL 26532041_006.eps
220402



7. Circuit Diagrams and PWB Layouts

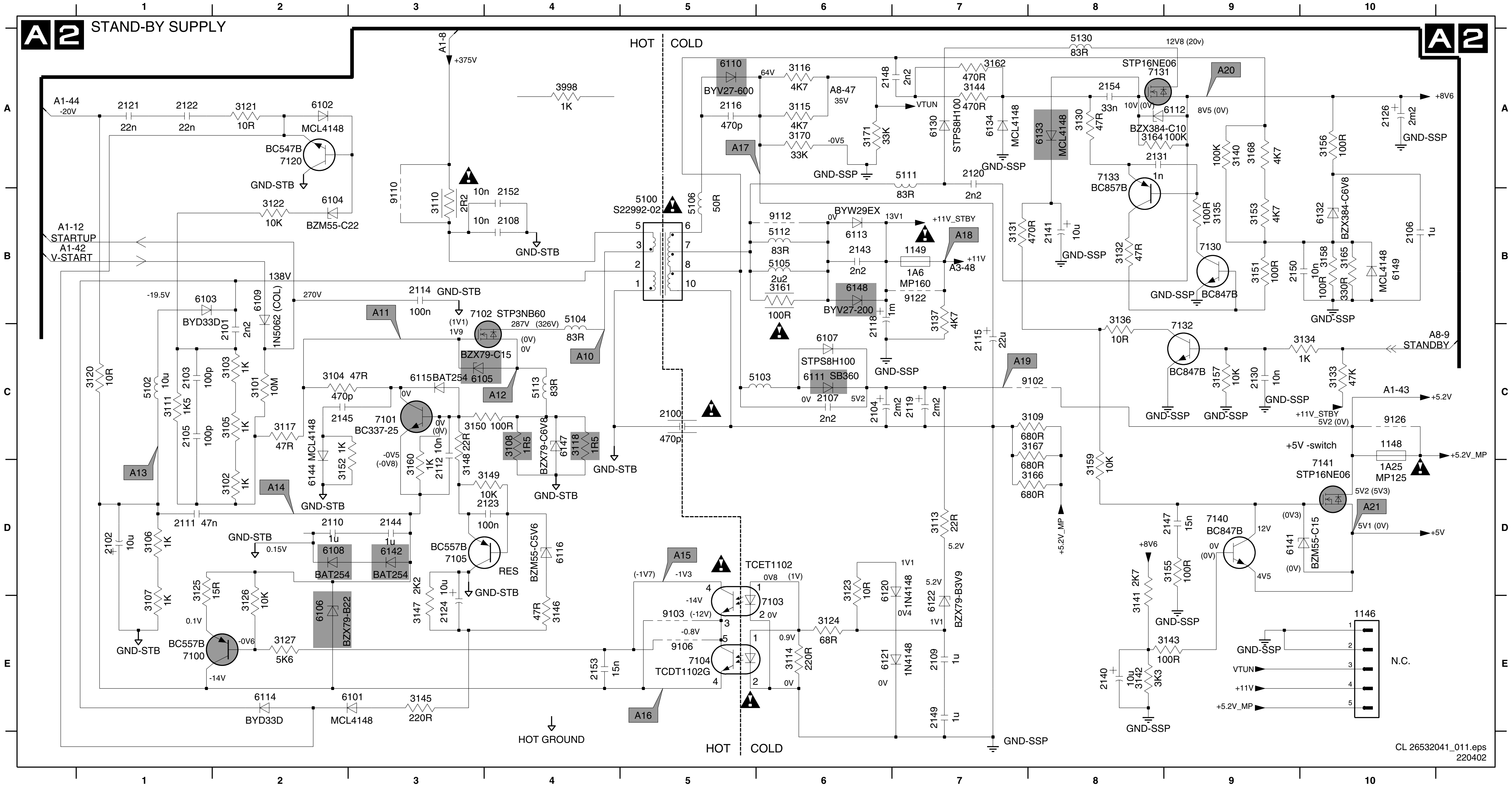
Large Signal Panel: Main Supply


A1
MAIN SUPPLY
HOT
COLD
1501
T5AH-250V
5511
5516
54A-0018
1503
F2,5AH-250V
GBU4J
6525
2509
22n
7504
STP5NB40FP
282V
148V
6505
BZX79-C15
3518
150K
6510
BZX79-C10
3513
330K
144V
143V
6530
BYV95C
2541
100p
2518
100p
3543
4R7
3511
2K2
3508
15R
2503
33n
7502
BC547B
3512
220K
3504
2K2
3547
390R
3514
0R39
6506
BAT254
2525
1n5
3505
22K
3509
V
2507
470n
5503
3521
4M7
5504
9503
5502
2508
22n
2537
22n
1500
SDDF
9502
9501
RES
DSP
1590
3501
220R
3551
220R
3500
1R
9513
9504
3552
2K2
7530
BC847B
3553
10K
2544
2n2
2516
330u
2517
10n
7507
TCET1103(G)
159V
6507
BAS316
18V2
17V2
2535
4n7
3535
47R
3515
0R39
6515
BZV85-C6V8
6534
BYV29F-400
2510
1n
2501
1n
5505
83R
9511
6514
BZT03-C
142V7
2523
47u
2515
47u
9510
5506
GND-AUD
VBATT
FROM 0202 OF
MAINS SWITCH PANEL
1505
139V
9516
1502
TO DEGAUSSING COIL
5515
33u
3536
1K
0V
2520
100n
0043
HEATSINK
GND-STB
3550
232266296
Rs
Rp
+t
9519
9518
3516
3531
6K8
2538
10n
3517
47K
7529
BC546B
-14V2
-15V6
6537
BAS316
3519
1K
2530
1u
6517
BAT254
6516
BAS216
3520
33K
3525
47R
2513
470p
6509
BAS216
3506
5K6
3522
6K8
7506
TL431CZ
16V6
2V5
2502
10n
2506
100n
3526
0R1
3542
0R15
3533
15R
SUP-ENABLE
A3-A4-23
2540
10u
6533
BAS216
9505
6523
BAS216
-20V
A2-44
3540
33K
3507
160K
2531
470p
2514
2n2
3523
1M
3510
820R
3530
1K
2524
10n
3527
2K
3549
100K
GND-SUP
3537
15R
2505
2n2
TUNERGND
1510
TO
0301 OF
M
FOR LATAM - AP SETS
About DC-voltages measured:
NORMAL ..V.
STANDBY (..V.)
HOT GROUND
A1
A2
A3
A4
A5
A6
A7
A8
50V / div DC
2us / div
5us / div
10us / div
5V / div DC
20V / div DC
PM3394B
6535
STPS8H100
19V4
5507
83R
2519
2n2
5514
33u
+16V+19V
2512
2m2
2542
1m
2511
2m2
2543
1m
2522
2n2
6536
5509
83R
5513
33u
-16V-19V
A2-43
+5.2V_MP
1550
6511
BAS216
6512
BAS216
7528
BC337-25
3529
4K7
DEGAUSSING
A8-30
3532
47K
3524
33K
7501
BC847B
3528
10K
2528
1u
3534
47K
GND-SSP
V-START
A2-42
+375V
A2-8
STARTUP
A2-12
MAIN SUPPLY REPAIR KIT: 3122 785 90310
CL 26532041_010.eps
180402

0043	D1
1500	B1
1501	A1
1502	C1
1503	A4
1505	C1
1510	F2
1550	D8
1590	C2
2501	C5
2502	E6
2503	A6
2504	B4
2505	F2
2506	E6
2507	B2
2508	B3
2509	A3
2510	C6
2511	B8
2512	B8
2513	D6
2514	D6
2515	C6
2516	C3
2517	C4
2518	A6
2519	B8
2520	D2
2522	C8
2523	C6
2524	E7
2525	B6
2528	E9
2530	F5
2531	D7
2535	C5
2537	B3
2538	E4
2540	F6
2541	A5
2542	B9
2543	B9
2544	C4
3500	C3
3501	C2
3504	B5
3505	B6
3506	D6
3507	D7
3508	A6
3509	B1
3510	D7
3511	A6
3512	B6
3513	A5
3514	B5
3515	B5
3516	E4
3517	E4
3518	A4
3519	F5
3520	D6
3521	B2
3522	E5
3523	D6
3524	E9
3525	D6
3526	E6
3527	E7
3528	E8
3529	E8
3530	E7
3531	E4
3532	E9
3533	F6
3534	F9
3535	C5
3536	D2
3537	E2
3540	D7
3542	E6
3543	A6
3547	B5
3549	E7
3550	D4
3551	C2
3552	B4
3553	C4
5502	B3
5503	B2
5504	B2
5505	C5
5506	C6
5507	B7
5509	C8
5511	A2
5513	C9
5514	B8
5515	D2
5516	A2
6505	B4
6506	B5
6507	C5
6509	D6
6510	A5
6511	D8
6512	E8
6514	C6
6515	C5
6516	F6
6517	E5
6523	F5
6525	A3
6530	A4
6533	F6
6534	C6
6535	A8
6536	C8
6537	F4
7501	E8
7502	A6
7504	A4
7506	E5
7507	C5
7528	E8
7529	F4
7530	B4
9501	B1
9502	B1
9503	B3
9504	B3
9505	F5
9510	D5
9511	C5
9513	C3
9516	C2
9518	E4
9519	E3

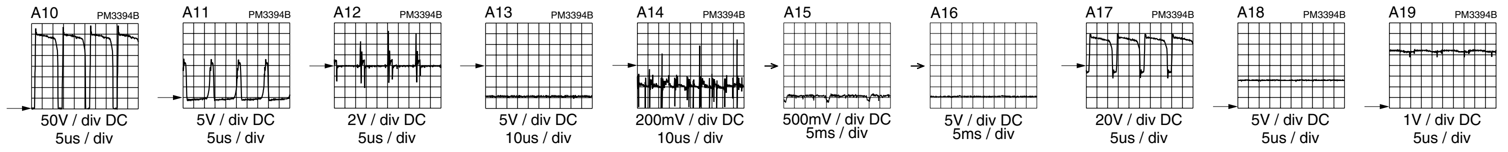
Large Signal Panel: Stand-by Supp;y

1146 E10
1148 C10
1149 B7
2100 C5
2101 C2
2102 D1
2103 C1
2104 C6
2105 C1
2106 B10
2107 C6
2108 B4
2109 E7
2110 D2
2111 D1
2112 D3
2114 B3
2115 C7
2116 A5
2118 C6
2119 C7
2120 A7
2121 A1
2122 A1
2123 D4
2124 E3
2126 A10
2130 C9
2131 A8
2140 E8
2141 B8
2143 B6
2144 D3
2145 C2
2147 D9
2148 A6
2149 E7
2150 B9
2152 A4
2153 E4
2154 A8
3101 C2
3102 D2
3103 C2
3104 C2
3105 C2
3106 D1
3107 E1
3108 C4
3109 C8
3110 B3
3111 C1
3113 D7
3114 E6
3115 A6
3116 A6
3117 C2
3118 C4
3120 C1
3121 A2
3122 B2
3123 D6
3124 E6
3125 D1
3126 E2
3127 E2
3130 A8
3131 B7
3132 B8
3133 C10
3134 C10
3135 B9
3136 B8
3137 B7
3140 A9
3141 E8
3142 E8
3143 E9
3144 A7
3145 E3
3146 E4
3147 E3
3148 D3
3149 D4
3150 C3
3151 B9
3152 D2
3153 B9
3155 D9
3156 A10
3157 C9
3158 B10
3159 D8
3160 D3
3161 B6
3162 A7
3164 A8
3165 B10
3166 D8
3167 C8
3168 A9
3170 A6
3171 A6
3998 A4
5100 B5
5102 C1
5103 C6
5104 B4
5105 B6
5106 B5
5111 A7
5112 B6
5113 C4
5130 A8
6101 E3
6102 A2
6103 B1
6104 B2
6105 C3
6106 E2
6107 C6
6108 D2
6109 B2
6110 A5
6111 C6
6112 A9
6113 B6
6114 E2
6115 C3
6116 D4
6120 D6
6121 E6
6122 E7
6130 A7
6132 B10
6133 A8
6134 A7
6141 D9
6142 D3
6144 D2
6147 C4
6148 B6
6149 B10
7100 E1
7101 C3
7102 B3
7103 E6
7104 E5
7105 D3
7120 A2
7130 B9
7131 A8
7132 C9
7133 A8
7140 D9
7141 D10
9102 C8
9103 E5
9106 E5
9110 B3
9112 B6
9122 B7
9126 C10


A2 STAND-BY SUPPLY
1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
HOT
COLD
A1-8
+375V
A1-44
-20V
2121 22n
2122 22n
3121 10R
6102 MCL4148
BC547B 7120
GND-STB
3122 10K
6104 BZM55-C22
A1-12 STARTUP
A1-42 V-START
138V
-19.5V
270V
6103 BYD33D
2101 2n2
6109 1N5062 (COL)
3998 1K
9110
3110
2R2
2152 10n
2108 10n
2114 100n
7102 STP3NB60
5104 83R
5100 S22992-02
5106 50R
BZX79-C15
6105
6115 BAT254
3104 47R
2145 470p
7101 BC337-25
3150 100R
3108 1R5
3118 1R5
BZX79-C6V8 6147
5113 83R
3117 47R
6144 MCL4148
3152 1K
3160 1K
2112 10n
3148 22R
3149 10K
2123 100n
GND-STB
2100 470p
3120 10R
5102 10u
3111 1K5
2103 100p
2105 100p
3103 1K
3105 1K
3102 1K
3101 10M
2111 47n
2110 1u
2144 1u
6108 BAT254
6142 BAT254
BC557B 7105
RES
BZM55-C5V6
6116
2102 10u
3106 1K
3107 1K
3125 15R
3126 10K
BC557B 7100
-0V6
-14V
3127 5K6
6106 BZX79-B22
3147 2K2
2124 10u
3146 47R
6114 BYD33D
6101 MCL4148
3145 220R
2153 15n
HOT GROUND
A10
A11
A12
A13
A14
A15
A16
A17
A18
A19
A20
A21
TCET1102
7103
9103 (-12V)
9106
7104 TCDT1102G
3114 220R
3124 68R
3123 10R
6120 1N4148
6121 1N4148
6122 BZX79-B3V9
3113 22R
2109 1u
2149 1u
6110 BYV27-600
64V
3116 4K7
2116 470p
3115 4K7
3170 33K
A8-47
35V
3171 33K
2148 2n2
3162 470R
3144 470R
VTUN
6130 STPS8H100
6134 MCL4148
GND-SSP
5111 83R
2120 2n2
9112
5112 83R
5105 2u2
3161 100R
BYW29EX
6113
13V1
+11V_STBY
2143 2n2
1149 1A6 MP160
A3-48
+11V
9122
6148 BYV27-200
2118 1m
3137 4K7
2115 22u
6107 STPS8H100
6111 SB360
5103
2107 2n2
2104 2m2
2119 2m2
9102
5130 83R
12V8 (20v)
STP16NE06 7131
2154 33n
6112
BZX384-C10
3164 100K
8V5 (0V)
6133 MCL4148
3130 47R
2131 1n
7133 BC857B
3131 470R
2141 10u
3132 47R
3140 100K
3168 4K7
3135 100R
3153 4K7
7130 BC847B
3151 100R
2150 10n
3158 100R
3165 330R
3156 100R
6132 BZX384-C6V8
6149 MCL4148
2106 1u
2126 2m2
+8V6
3136 10R
7132 BC847B
3157 10K
2130 10n
3134 1K
A8-9 STANDBY
3133 47K
A1-43
+5.2V
+11V_STBY 5V2 (0V)
9126
+5V -switch
1148 1A25 MP125
+5.2V_MP
7141 STP16NE06
3109 680R
3167 680R
3166 680R
3159 10K
2147 15n
7140 BC847B
6141 BZM55-C15
+5V
3155 100R
3141 2K7
3143 100R
3142 3K3
2140 10u
1146
N.C.
VTUN
+11V
CL 26532041_011.eps
220402

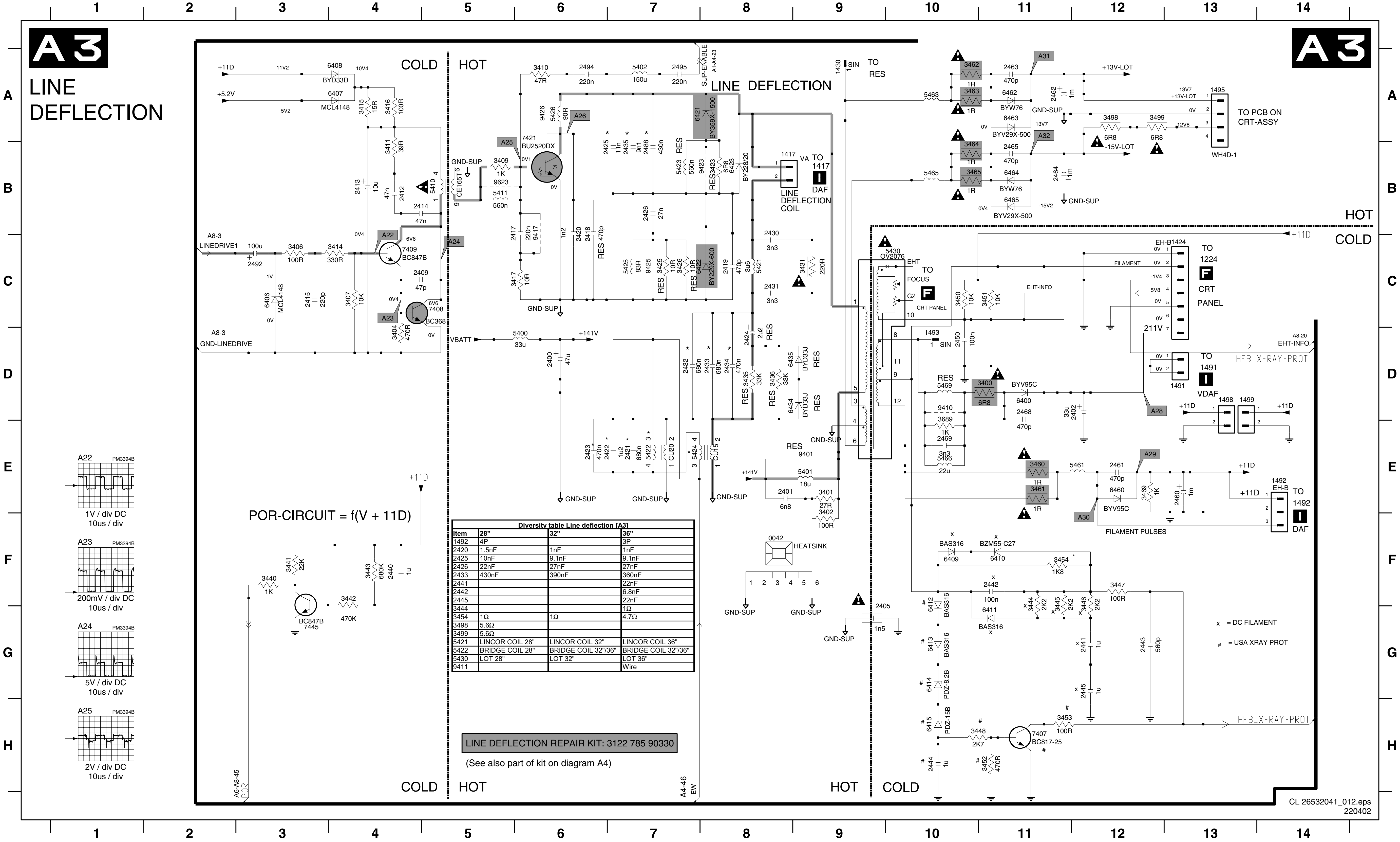
About DC-voltages measured:
NORMAL ..V.
STANDBY (..V.)

STANDBY SUPPLY REPAIR KIT: 3122 785 90460



Large Signal Panel: Line Deflection

0042 F8	1498 D13	2413 B4	2422 E7	2433 D8	2445 G12	2468 D11	3402 F9	3415 A4	3436 D8	3447 F11	3461 E11	3689 E10	5423 B7	5466 E10	6411 F10	6434 D8	7408 C5	9425 C7
1417 B8	1499 D13	2414 B4	2423 E6	2434 D8	2450 D10	2469 E10	3404 D4	3416 A4	3440 F3	3448 H10	3462 A10	5400 D6	5424 E7	5469 D10	6412 F10	6435 D8	7409 C4	9426 A6
1424 C13	2400 D6	2415 C3	2424 D8	2435 B7	2460 E13	2488 B7	3406 C3	3417 C6	3441 F3	3450 C10	3463 A10	5401 E9	5425 C7	6400 D11	6413 G10	6460 E12	7421 A6	9623 B5
1430 A10	2401 E8	2417 B6	2425 B7	2440 F4	2461 E12	2492 C3	3407 C4	3423 B8	3442 F4	3451 C11	3464 B10	5402 A7	5426 A6	6406 C3	6414 G10	6462 A11	7445 F3	
1491 D13	2402 D12	2418 B6	2426 B7	2441 G12	2462 A11	2494 A6	3409 B5	3425 C7	3443 F4	3452 H11	3465 B10	5410 B5	5430 C10	6407 A4	6415 H10	6463 A11	9401 E9	
1492 E14	2405 G9	2419 C8	2430 C8	2442 F10	2463 A11	2495 A7	3410 A6	3426 C7	3444 F12	3453 H11	3469 E12	5411 B5	5461 E12	6408 A4	6421 A7	6464 B11	9410 D10	
1493 D10	2409 C4	2420 B6	2431 C8	2443 G11	2464 B11	3400 D11	3411 B4	3431 C9	3445 F13	3454 F11	3498 A12	5421 C8	5463 A10	6409 F10	6422 C7	6465 B11	9417 B6	
1495 A13	2412 B4	2421 E7	2432 D7	2444 H10	2465 B11	3401 E9	3414 C4	3435 D8	3446 F13	3460 E11	3499 A12	5422 E7	5465 B10	6410 F11	6423 B8	7407 H11	9423 B8	


A3
LINE DEFLECTION
COLD
HOT
LINE DEFLECTION
+11D
+5.V
A8-3 LINEDRIVE1
A8-3 GND-LINEDRIVE
7409 BC847B
7408 BC368
7421 BU2520DX
GND-SUP
VBATT
+141V
SUP-ENABLE
TO 1417 DAF
LINE DEFLECTION COIL
+13V-LOT
-15V-LOT
TO PCB ON CRT-ASSY
WH4D-1
EHT
TO FOCUS
G2
F
CRT PANEL
5430 OV2076
TO 1224 CRT PANEL
EHT-INFO
FILAMENT
HFB_X-RAY-PROT
TO 1491 VDAF
TO 1492 DAF
FILAMENT PULSES
HEATSINK
POR-CIRCUIT = f(V + 11D)
7445 BC847B
7407 BC817-25
x = DC FILAMENT
# = USA XRAY PROT
A22 1V / div DC 10us / div
A23 200mV / div DC 10us / div
A24 5V / div DC 10us / div
A25 2V / div DC 10us / div
PM3394B
CL 26532041_012.eps
220402

Diversity table Line deflection [A3]			
Item	**28"**	**32"**	**36"**
1492	4P		3P
2420	1.5nF	1nF	1nF
2425	10nF	9.1nF	9.1nF
2426	22nF	27nF	27nF
2433	430nF	390nF	360nF
2441			22nF
2442			6.8nF
2445			22nF
3444			1Ω
3454	1Ω	1Ω	4.7Ω
3498	5.6Ω		
3499	5.6Ω		
5421	LINCOR COIL 28"	LINCOR COIL 32"	LINCOR COIL 36"
5422	BRIDGE COIL 28"	BRIDGE COIL 32"/36"	BRIDGE COIL 32"/36"
5430	LOT 28"	LOT 32"	LOT 36"
9411			Wire

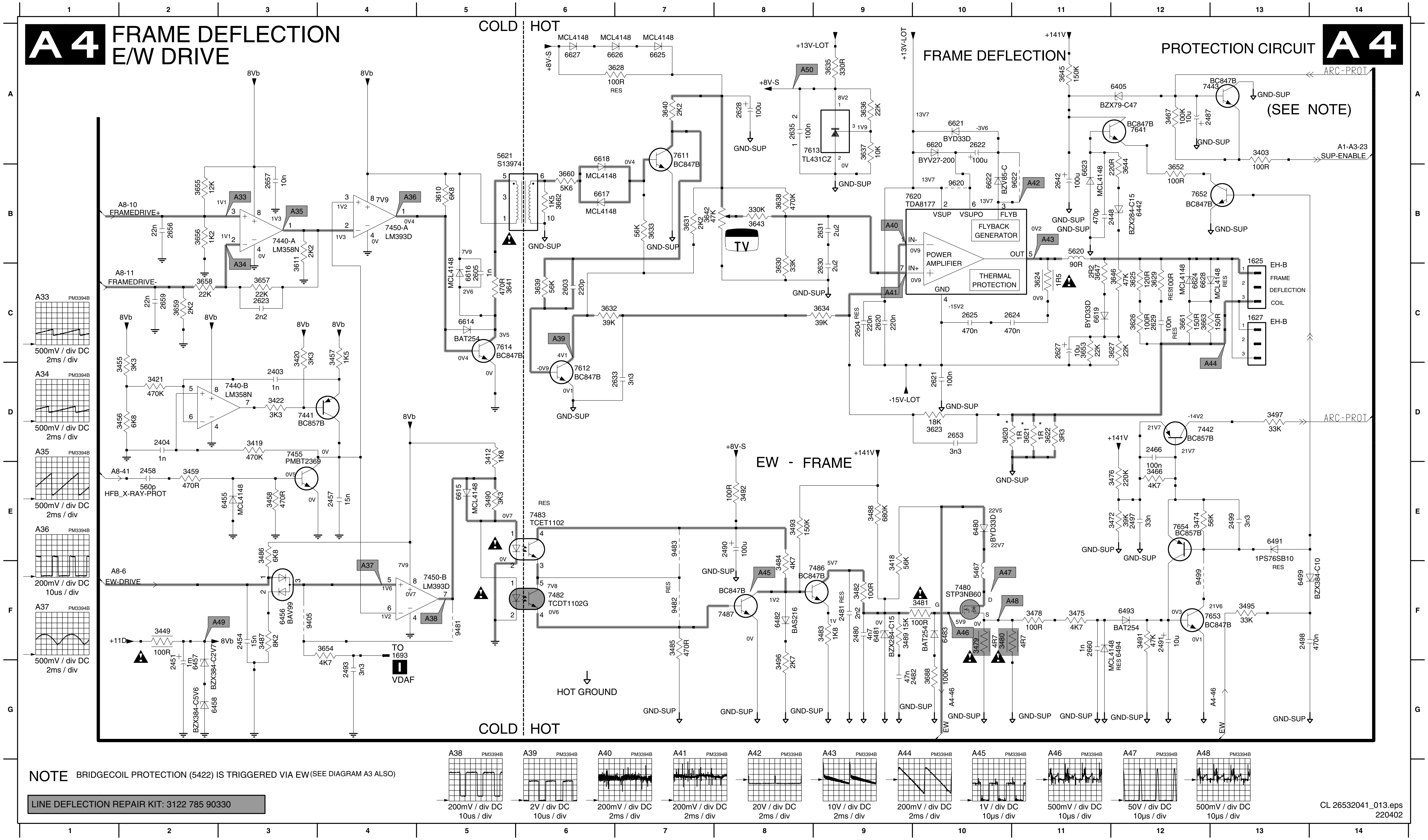
LINE DEFLECTION REPAIR KIT: 3122 785 90330

(See also part of kit on diagram A4)

Large Signal Panel: Frame Deflection E/W Drive

1625 C13
1627 C13
1693 F4
2403 D3
2404 D2
2448 B12
2451 G2
2454 F3
2457 E4
2458 E2
2466 D12
2480 F9
2481 F9
2482 G10
2487 A12
2490 E8
2491 F12
2493 G4
2497 E12
2498 F13
2499 E13
2603 C6
2604 C9
2605 C5
2620 C9
2621 D10
2622 A10
2623 C3
2624 C11
2625 C10
2627 C11
2628 A8
2629 C12
2630 C9
2631 B9
2633 D7
2635 A8
2642 B11
2653 D10
2656 B2
2657 B3
2659 C2
2660 F11
3403 A13
3412 D5
3418 F9
3419 D3
3420 C3
3421 D2
3422 D3
3449 F2
3455 D2
3456 D2
3457 C4
3458 E3
3459 E2
3466 E12
3467 A12
3472 E12
3474 E12
3475 F11
3476 E12
3478 F11
3479 F10
3480 F10
3481 F10
3482 F9
3483 F9
3484 F8
3485 F7
3486 E3
3487 F3
3488 E9
3489 F9
3490 E5
3491 F12
3492 E8
3493 E8
3495 F13
3496 G8
3497 D13
3610 B5
3611 C3
3620 D10
3621 D11
3622 D11
3623 D10
3624 C11
3625 C12
3626 C12
3627 C12
3628 A7
3629 C12
3630 C8
3631 B7
3632 C6
3633 B7
3634 C9
3635 A9
3636 A9
3637 A9
3638 B8
3639 C6
3640 A7
3641 C5
3642 B7
3643 B8
3644 B12
3645 A11
3646 C12
3647 C11
3652 B12
3653 C11
3654 F4
3655 B2
3656 B2
3657 C3
3658 C2
3659 C2
3660 B6
3661 C12
3662 B6
3663 C12
3688 G10
5467 F10
5620 B11
5621 A5
6405 A12
6442 B12
6455 E3
6456 F3
6457 G2
6458 G2
6480 E10
6481 F9
6482 F8
6483 F10
6491 E13
6493 F12
6494 F12
6499 F13
6614 C5
6615 E5
6616 C5
6617 B6
6618 A6
6619 C11
6620 A10
6621 A10
6622 B10
6623 B11
6624 C12
6625 A7
6626 A7
6627 A6
6628 C12
7440-A B3
7440-B D3
7441 D3
7442 D13
7443 A12
7450-A B4
7450-B F5
7455 D3
7480 F10
7482 F6
7483 E6
7486 F8
7487 F8
7611 A7
7612 D6
7613 A8
7614 C5
7620 B9
7641 A12
7652 B12
7653 F12
7654 E12
9405 F3
9481 F5
9482 F7
9483 E7
9499 F12
9620 B10
9622 B11

Diversity table Frame deflection [A4]			
Item	**28"**	**32"**	**36"**
1693			1P
2493			3.3nF
3480		6.8Ω	
3488	1MΩ	680kΩ	1MΩ
3621	1Ω	1.5Ω	1Ω
3622	1.5Ω	1.8Ω	1Ω
3625	120Ω	220Ω	56Ω
3626	100Ω	220Ω	56Ω
3654			4.7kΩ
3661		470Ω	120Ω
6499	BZX384-C10	PDZ9.1B	BZX384-C10
6624		BAS316	BAS316



A4 FRAME DEFLECTION E/W DRIVE
COLD
HOT
FRAME DEFLECTION
PROTECTION CIRCUIT A4
(SEE NOTE)
EW - FRAME
A8-10 FRAMEDRIVE+
A8-11 FRAMEDRIVE-
A8-41 HFB_X-RAY-PROT
A8-6 EW-DRIVE
A1-A3-23 SUP-ENABLE
ARC-PROT
8Vb
+8V-S
+13V-LOT
+141V
-15V-LOT
GND-SUP
7440-A LM358N
7440-B LM358N
7450-A LM393D
7450-B LM393D
7441 BC857B
7455 PMBT2369
7611 BC847B
7612 BC847B
7613 TL431CZ
7614 BC847B
7620 TDA8177
POWER AMPLIFIER
FLYBACK GENERATOR
THERMAL PROTECTION
VSUP
VSUPO
FLYB
IN-
IN+
OUT
GND
7641 BC847B
7443 BC847B
7652 BC847B
7442 BC857B
7653 BC847B
7654 BC857B
7480 STP3NB60
7482 TCDT1102G
7483 TCET1102
7486 BC847B
7487 BC847B
5621 S13974
TV
HOT GROUND
TO 1693 VDAF
1625 EH-B FRAME DEFLECTION COIL
1627 EH-B
A33 A34 A35 A36 A37 A38 A39 A40 A41 A42 A43 A44 A45 A46 A47 A48 A49 A50
A33 500mV / div DC 2ms / div
A34 500mV / div DC 2ms / div
A35 500mV / div DC 2ms / div
A36 200mV / div DC 10us / div
A37 500mV / div DC 2ms / div
A38 200mV / div DC 10us / div
A39 2V / div DC 10us / div
A40 200mV / div DC 2ms / div
A41 200mV / div DC 2ms / div
A42 20V / div DC 2ms / div
A43 10V / div DC 2ms / div
A44 200mV / div DC 2ms / div
A45 1V / div DC 10µs / div
A46 500mV / div DC 10µs / div
A47 50V / div DC 10µs / div
A48 500mV / div DC 10µs / div
PM3394B

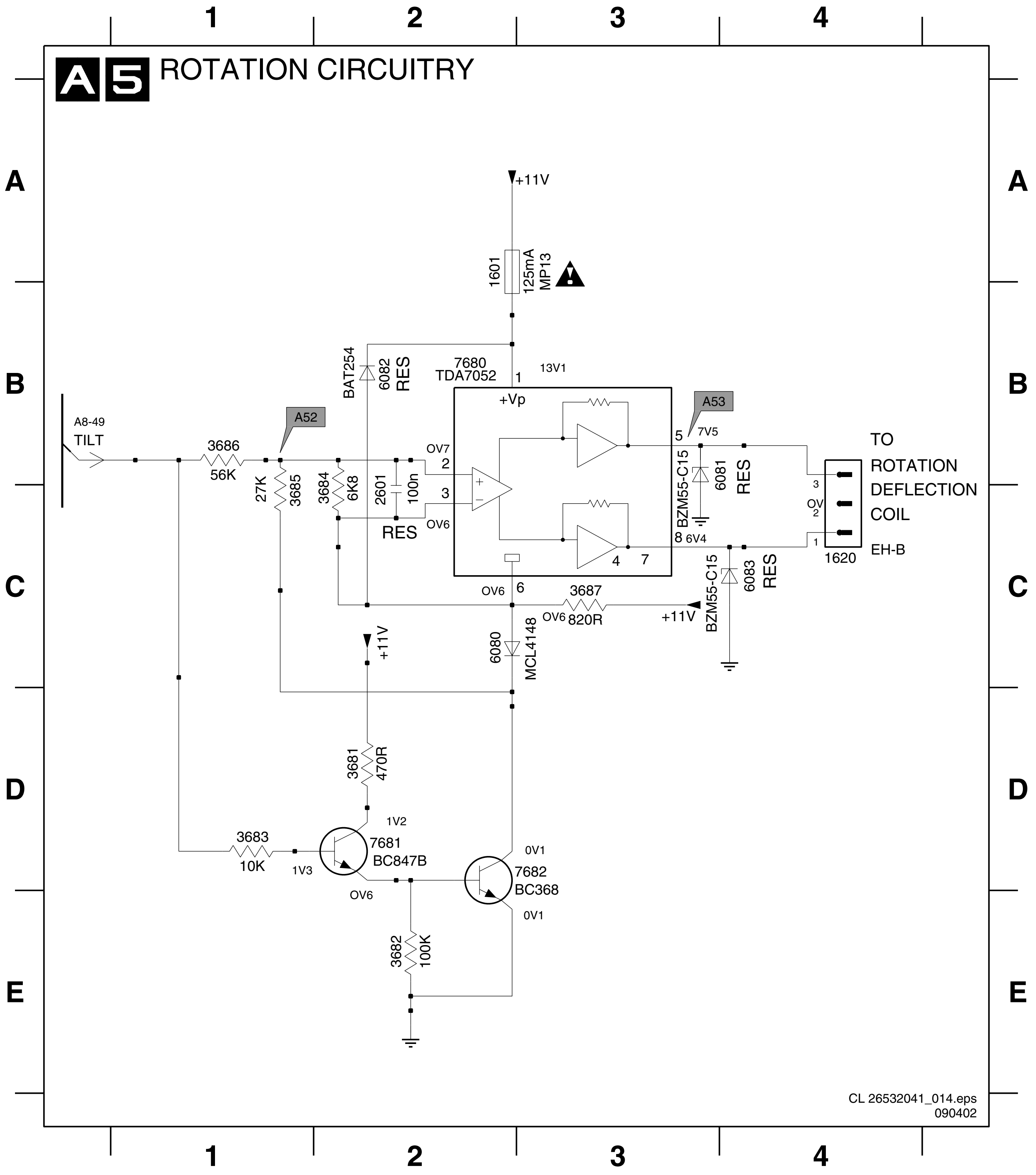
NOTE BRIDGECOIL PROTECTION (5422) IS TRIGGERED VIA EW (SEE DIAGRAM A3 ALSO)

LINE DEFLECTION REPAIR KIT: 3122 785 90330

CL 26532041_013.eps
220402

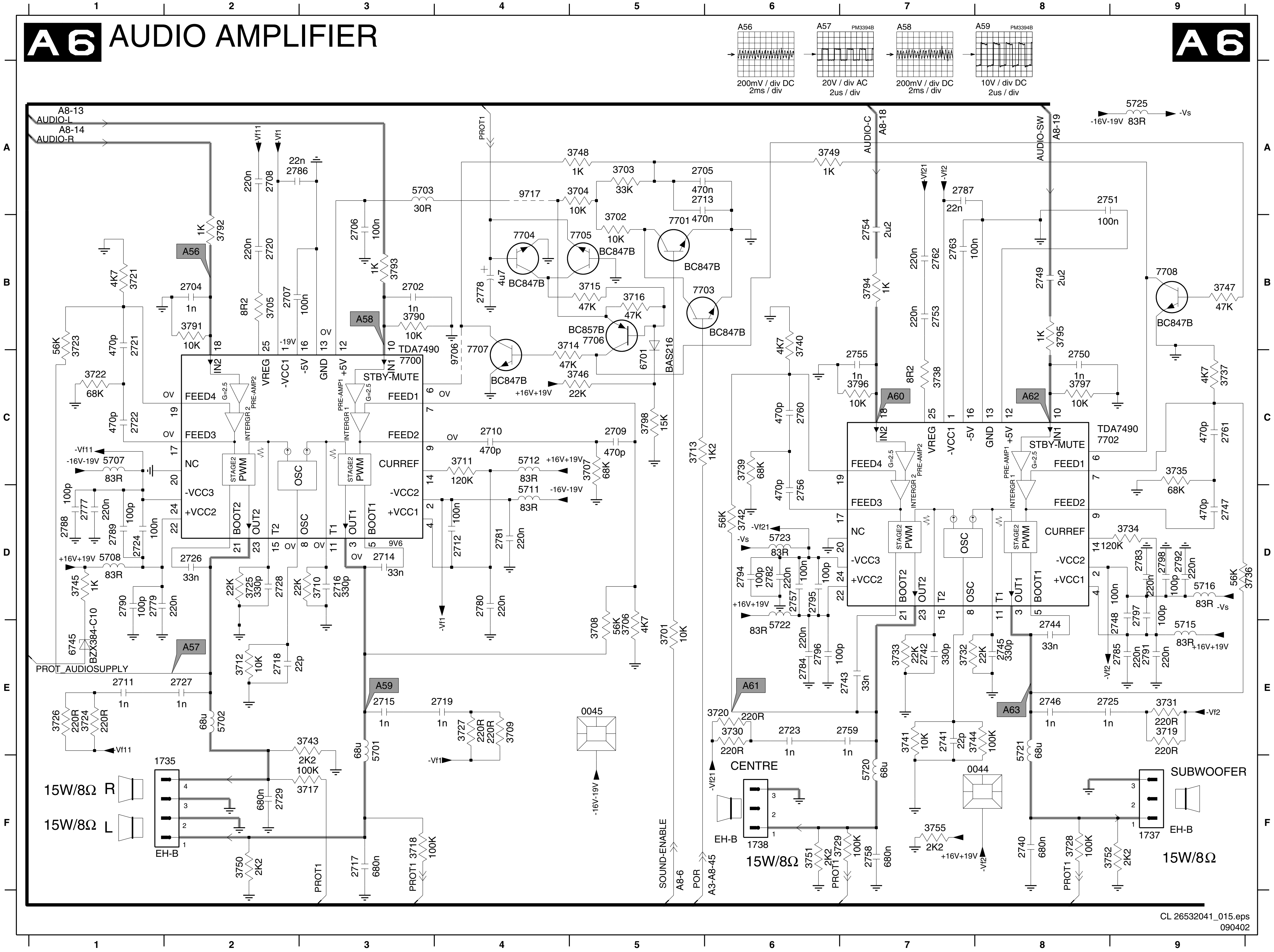
Large Signal Panel: Rotation Circuitry

1601 A2
1620 C4
2601 C2
3681 D2
3682 E2
3683 D1
3684 C2
3685 C1
3686 B1
3687 C3
6080 C2
6081 B3
6082 B2
6083 C4
7680 B2
7681 D2
7682 D2


1
2
3
4
A
B
C
D
E
A5
ROTATION CIRCUITRY
+11V
1601
125mA
MP13
BAT254
6082
RES
7680
TDA7052
1
13V1
+Vp
A53
A52
A8-49
TILT
3686
56K
27K
3685
3684
6K8
2601
100n
RES
OV7
2
3
OV6
5
7V5
BZM55-C15
6081
RES
8
6V4
4
7
TO
ROTATION
DEFLECTION
COIL
3
OV
2
1
1620
EH-B
6083
RES
BZM55-C15
OV6
6
3687
OV6
820R
+11V
+11V
6080
MCL4148
3681
470R
1V2
3683
10K
1V3
7681
BC847B
OV6
0V1
7682
BC368
0V1
3682
100K
CL 26532041_014.eps
090402

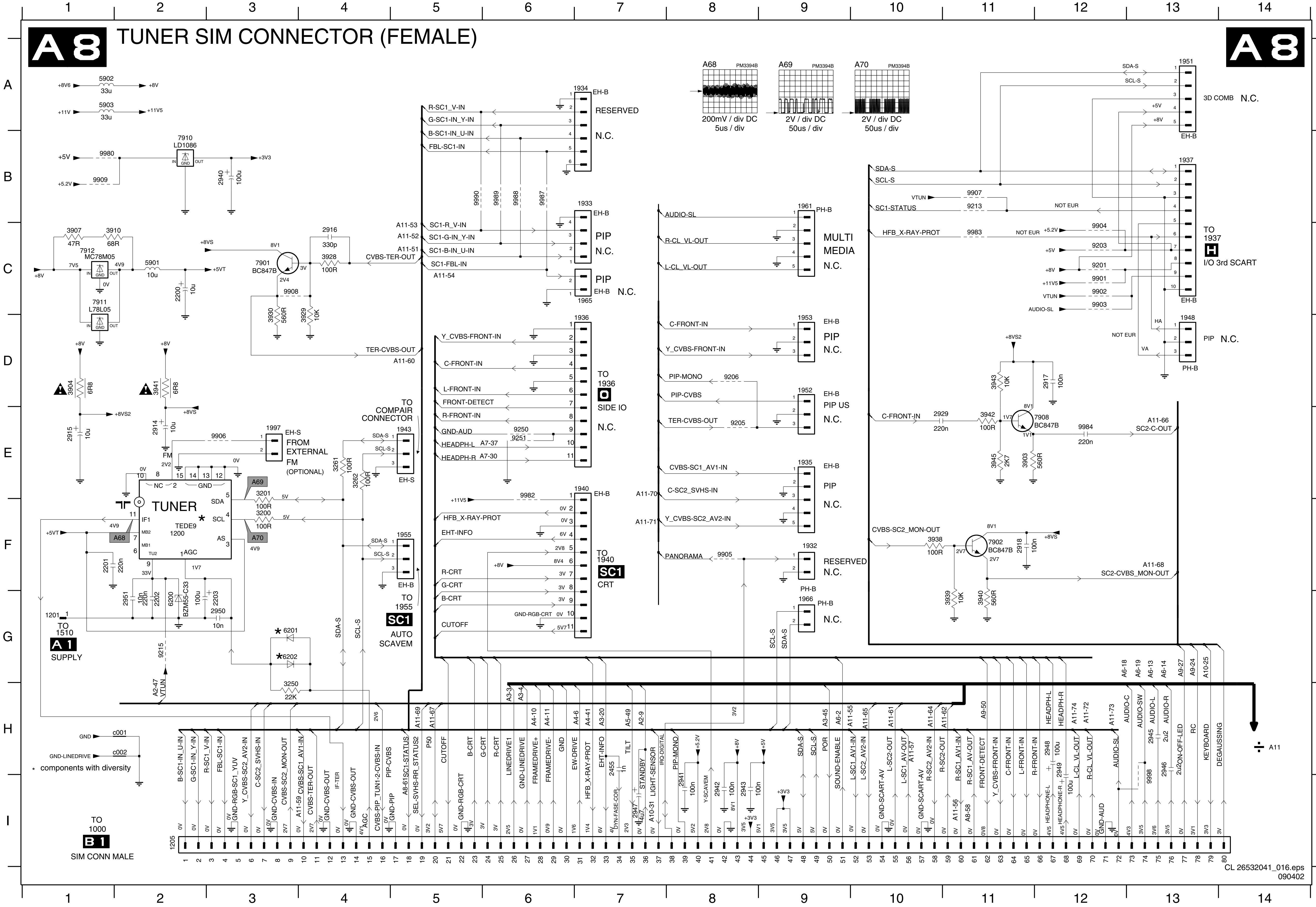
Personal Notes:

Large Signal Panel: Audio Amplifier


A6
AUDIO AMPLIFIER
A6
A56
200mV / div DC
2ms / div
A57
PM3394B
20V / div AC
2us / div
A58
200mV / div DC
2ms / div
A59
PM3394B
10V / div DC
2us / div
A8-13
AUDIO-L
A8-14
AUDIO-R
A8-18
AUDIO-C
A8-19
AUDIO-SW
TDA7490
7700
TDA7490
7702
IN2
VREG
-VCC1
-5V
GND
+5V
IN1
STBY-MUTE
FEED4
FEED3
FEED1
FEED2
NC
CURREF
-VCC3
+VCC2
-VCC2
+VCC1
BOOT2
OUT2
T2
OSC
T1
OUT1
BOOT1
PRE-AMP2
PRE-AMP1
INTERGR 2
INTERGR 1
STAGE2
PWM
G=2.5
BC847B
BC857B
BAS216
BZX384-C10
5725
-16V-19V
83R
-Vs
PROT1
PROT_AUDIOSUPPLY
SOUND-ENABLE
A8-6
POR
A3-A8-45
0044
0045
1735
1737
1738
EH-B
15W/8Ω R
15W/8Ω L
CENTRE
15W/8Ω
SUBWOOFER
15W/8Ω
+16V+19V
-Vf1
-Vf11
-Vf2
-Vf21
A60
A61
A62
A63
CL 26532041_015.eps
090402

0044	F7
0045	E5
1735	F2
1737	F9
1738	F6
2702	B3
2704	B2
2705	A5
2706	B3
2707	B2
2708	A2
2709	C5
2710	C4
2711	E1
2712	D4
2713	A5
2714	D3
2715	E3
2716	D3
2717	F3
2718	E2
2719	E4
2720	B2
2721	B1
2722	C1
2723	E6
2724	D1
2725	E8
2726	D2
2727	E2
2728	D2
2729	F2
2740	F8
2741	E7
2742	E7
2743	E7
2744	E8
2745	E8
2746	E8
2747	D9
2748	E9
2749	B8
2750	C8
2751	A8
2753	B7
2754	B7
2755	C7
2756	D6
2757	D6
2758	F7
2759	E7
2760	C6
2761	C9
2762	B7
2763	B7
2777	D1
2778	B4
2779	D1
2780	D4
2781	D4
2782	D6
2783	D9
2784	E6
2785	E9
2786	A2
2787	A7
2788	D1
2789	D1
2790	D1
2791	E9
2792	D9
2794	D6
2795	D6
2796	E6
2797	D9
2798	D9
3701	E5
3702	A5
3703	A5
3704	A5
3705	B2
3706	E5
3707	C5
3708	E5
3709	E4
3710	D3
3711	C4
3712	E2
3713	C5
3714	B4
3715	B5
3716	B5
3717	F3
3718	F3
3719	E9
3720	E6
3721	B1
3722	C1
3723	B1
3724	E1
3725	D2
3726	E1
3727	E4
3728	F8
3729	F7
3730	E6
3731	E9
3732	E7
3733	E7
3734	D9
3735	C9
3736	D9
3737	C9
3738	C7
3739	C6
3740	B6
3741	E7
3742	D6
3743	E3
3744	E8
3745	D1
3746	C5
3747	B9
3748	A5
3749	A6
3750	F2
3751	F6
3752	F9
3755	F7
3790	B3
3791	B2
3792	B2
3793	B3
3794	B7
3795	B8
3796	C7
3797	C8
3798	C5
5701	E3
5702	E2
5703	A3
5707	C1
5708	D1
5711	D4
5712	C4
5715	E9
5716	D9
5720	F7
5721	E8
5722	E6
5723	D6
5725	A9
6701	C5
6745	E1
7700	C3
7701	B5
7702	C8
7703	B5
7704	B4
7705	B5
7706	B5
7707	C4
7708	B9
9706	C4
9717	A4

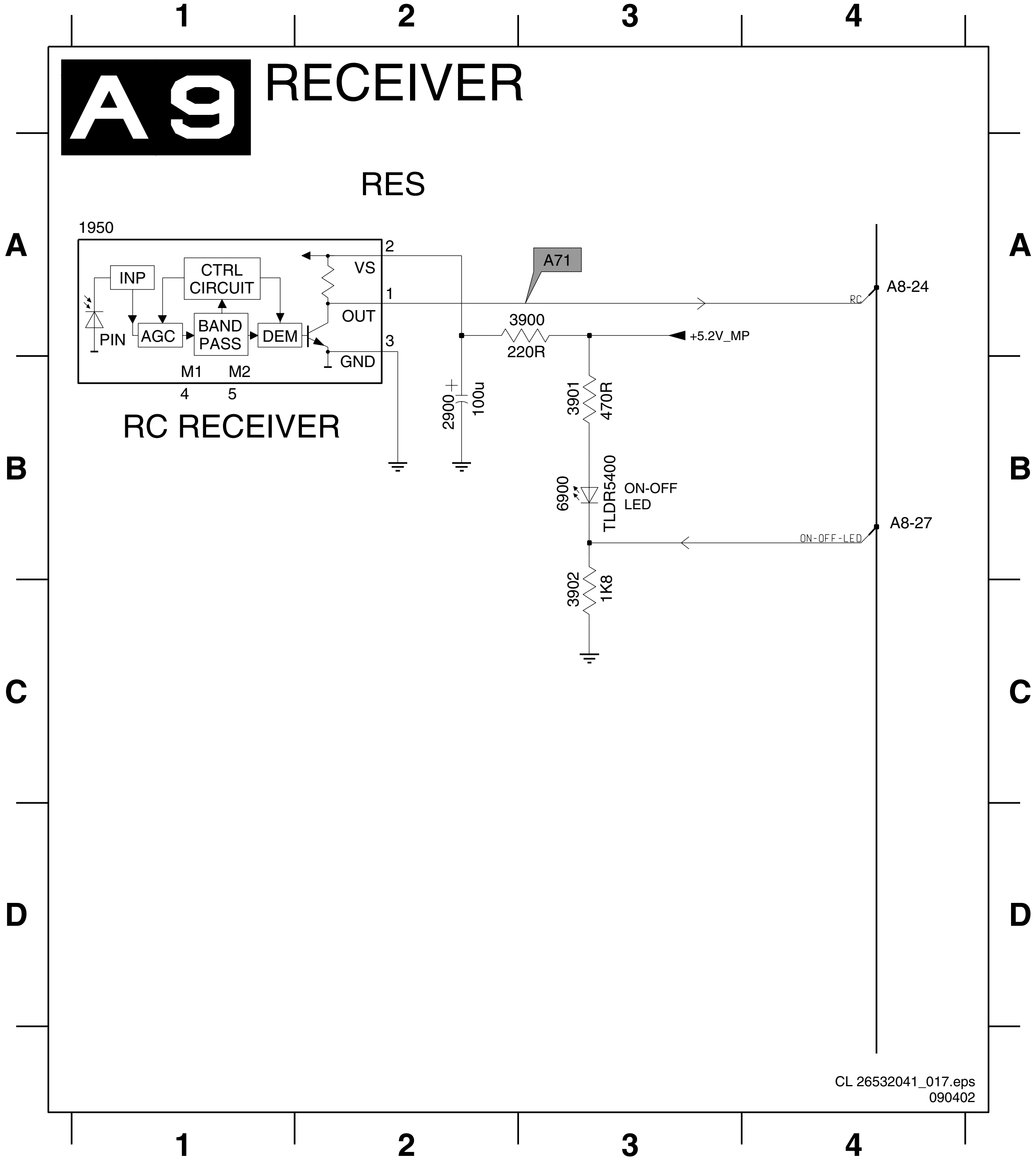
Large Signal Panel: Tuner SIM Connector (Female)


A8
TUNER SIM CONNECTOR (FEMALE)
A8
TUNER
TEDE9
1200
7910
LD1086
7912
MC78M05
7911
L78L05
7901
BC847B
7908
BC847B
7902
BC847B
A68 PM3394B 200mV / div DC 5us / div
A69 PM3394B 2V / div DC 50us / div
A70 PM3394B 2V / div DC 50us / div
1934 RESERVED N.C.
1933 PIP N.C.
1965 PIP N.C.
1936 TO 1936 SIDE IO N.C.
1940 TO 1940 SC1 CRT
1997 FROM EXTERNAL FM (OPTIONAL)
1943 TO COMPAIR CONNECTOR
1955 TO 1955 SC1 AUTO SCAVEM
1961 MULTI MEDIA N.C.
1953 PIP N.C.
1952 PIP US N.C.
1935 PIP N.C.
1932 RESERVED N.C.
1966 N.C.
1951 3D COMB N.C.
1937 TO 1937 H I/O 3rd SCART
1948 PIP N.C.
1201 TO 1510 A1 SUPPLY
TO 1000 B1 SIM CONN MALE
1205
A11
* components with diversity
CL 26532041_016.eps
090402

1200	F2
1201	G1
1205	I2
1932	F9
1933	B7
1934	A6
1935	E9
1936	D6
1937	B13
1940	E6
1943	E5
1948	D13
1951	A13
1952	D9
1953	D9
1955	F5
1961	B9
1965	C7
1966	G9
1997	E3
2200	C2
2201	F1
2202	G2
2203	G3
2455	H7
2914	E2
2915	E1
2916	C4
2917	D12
2918	F11
2929	E10
2940	B3
2941	I8
2942	I8
2943	I8
2945	H13
2946	H13
2947	I7
2948	H12
2949	H12
2950	G3
2951	G2
3200	F3
3201	E3
3250	H3
3261	E4
3262	E4
3903	E11
3904	D1
3907	C1
3910	C1
3928	C4
3929	D4
3930	D3
3938	F10
3939	G11
3940	G11
3941	D2
3942	E11
3943	D11
3945	E11
5901	C2
5902	A1
5903	A1
6200	G2
6201	G3
6202	G3
7901	C3
7902	F11
7908	E11
7910	B2
7911	C1
7912	C1
9201	C12
9203	C12
9205	E8
9206	D8
9213	B11
9215	G2
9250	E6
9251	E6
9901	C12
9902	C12
9903	C12
9904	C12
9905	F8
9906	E3
9907	B11
9908	C3
9909	B1
9980	B1
9982	E6
9983	C11
9984	E12
9987	B6
9988	B6
9989	B6
9990	B5
9998	I13

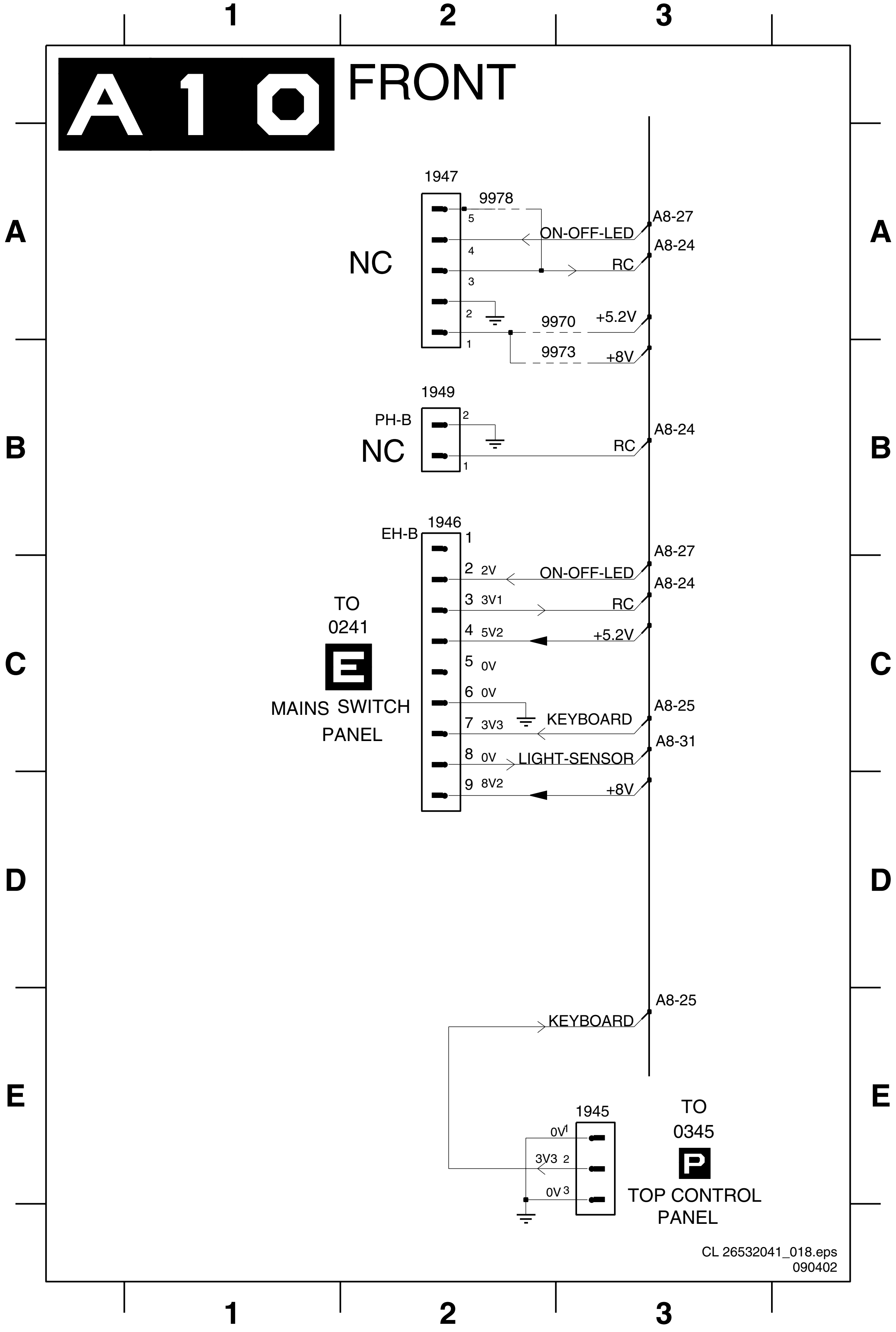
Large Signal Panel: REceiver

1950 A1
2900 B2
3900 A3
3901 B3
3902 C3
6900 B3

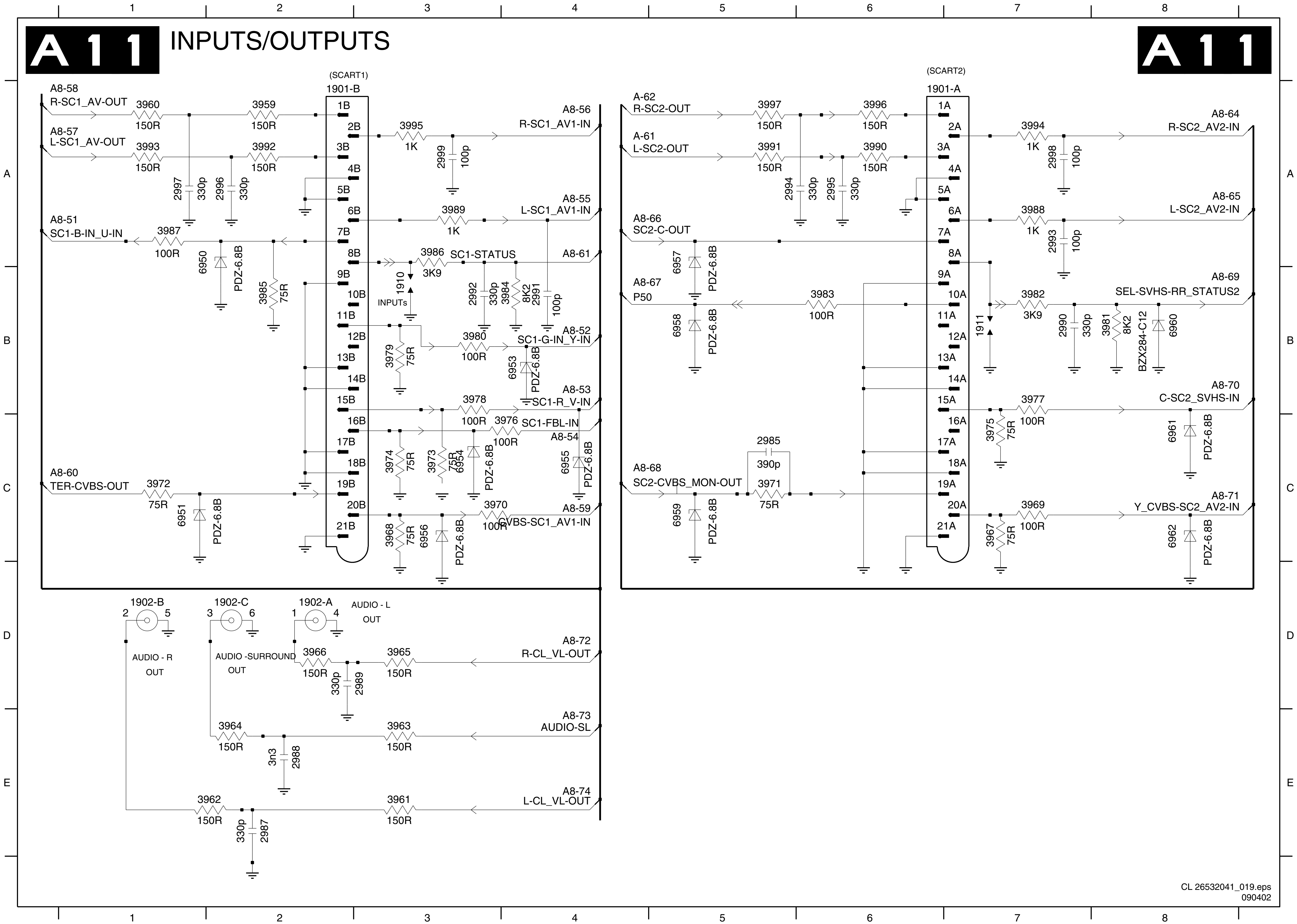

A9
RECEIVER
RES
1950
INP
CTRL CIRCUIT
PIN
AGC
BAND PASS
DEM
VS
OUT
GND
M1
M2
4
5
2
1
3
RC RECEIVER
A71
3900
220R
+5.2V_MP
RC
A8-24
2900
100u
3901
470R
6900
TLDR5400
ON-OFF LED
ON-OFF-LED
A8-27
3902
1K8
CL 26532041_017.eps
090402
1
2
3
4
A
B
C
D

Large Signal Panel: Front

1945 E3
1946 B2
1947 A2
1949 B2
3999 E1
9970 A3
9973 B3
9978 A2


A10
FRONT
1947
9978
NC
5
4
3
2
1
ON-OFF-LED
A8-27
RC
A8-24
9970
+5.2V
9973
+8V
1949
PH-B
NC
2
1
RC
A8-24
1946
EH-B
TO
0241
E
MAINS SWITCH PANEL
1
2 2V
3 3V1
4 5V2
5 0V
6 0V
7 3V3
8 0V
9 8V2
ON-OFF-LED
A8-27
RC
A8-24
+5.2V
KEYBOARD
A8-25
LIGHT-SENSOR
A8-31
+8V
KEYBOARD
A8-25
1945
0V 1
3V3 2
0V 3
TO
0345
P
TOP CONTROL PANEL
CL 26532041_018.eps
090402
1
2
3
A
B
C
D
E

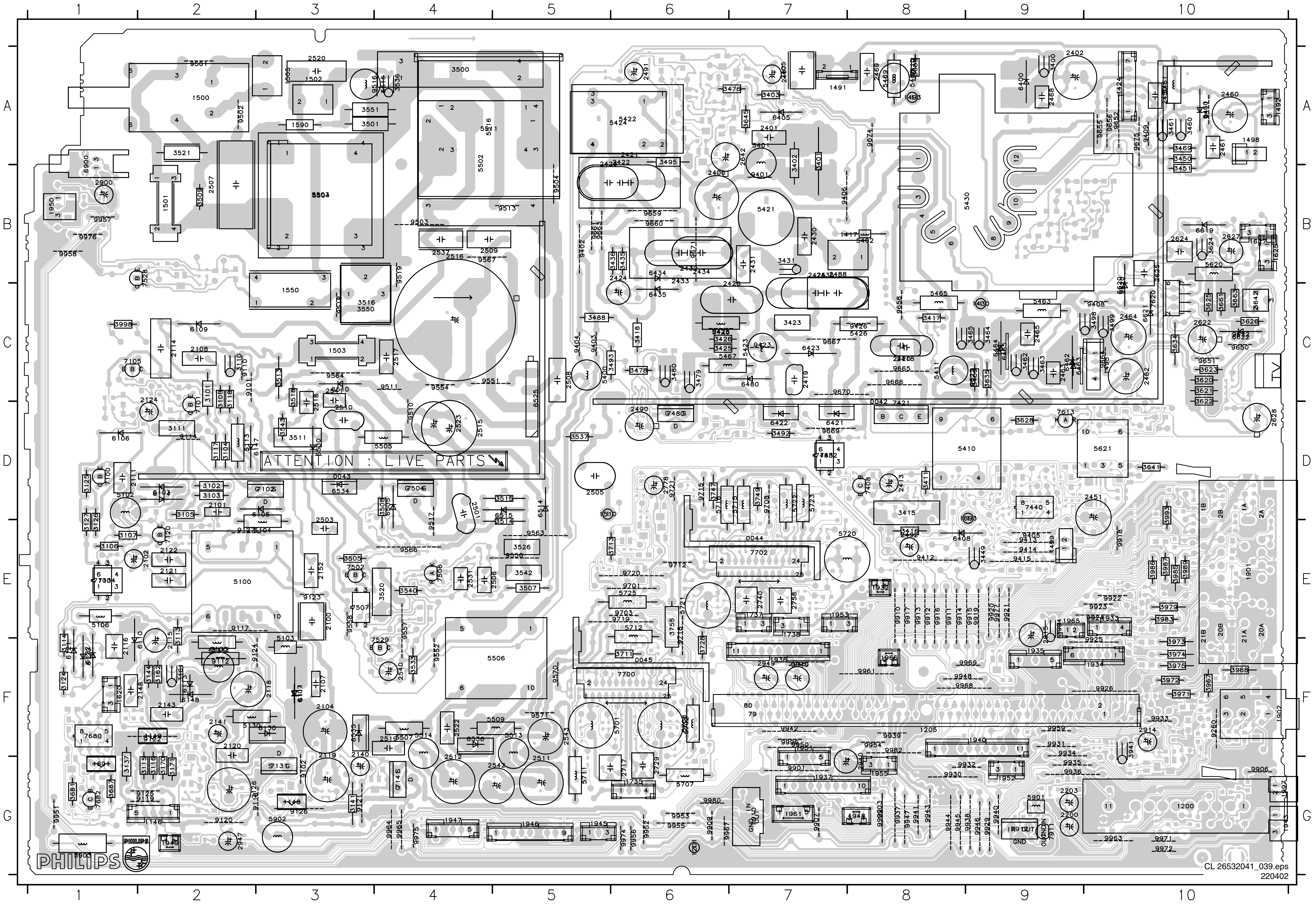
Large Signal Panel: Inputs/Outputs


A11
INPUTS/OUTPUTS
A11
(SCART1)
1901-B
(SCART2)
1901-A
A8-58
R-SC1_AV-OUT
A8-57
L-SC1_AV-OUT
A8-51
SC1-B-IN_U-IN
A8-60
TER-CVBS-OUT
A8-56
R-SC1_AV1-IN
A8-55
L-SC1_AV1-IN
A8-61
SC1-STATUS
A8-52
SC1-G-IN_Y-IN
A8-53
SC1-R_V-IN
SC1-FBL-IN
A8-54
A8-59
CVBS-SC1_AV1-IN
INPUTs
1910
1911
A-62
R-SC2-OUT
A-61
L-SC2-OUT
A8-66
SC2-C-OUT
A8-67
P50
A8-68
SC2-CVBS_MON-OUT
A8-64
R-SC2_AV2-IN
A8-65
L-SC2_AV2-IN
A8-69
SEL-SVHS-RR_STATUS2
A8-70
C-SC2_SVHS-IN
A8-71
Y_CVBS-SC2_AV2-IN
BZX284-C12
PDZ-6.8B
1902-B
1902-C
1902-A
AUDIO - R OUT
AUDIO -SURROUND OUT
AUDIO - L OUT
A8-72
R-CL_VL-OUT
A8-73
AUDIO-SL
A8-74
L-CL_VL-OUT
CL 26532041_019.eps
090402

Component	Position
1901-A	A6
1901-B	A2
1902-A	D2
1902-B	D1
1902-C	D2
1910	B3
1911	B7
2985	C5
2987	E2
2988	E2
2989	D3
2990	B7
2991	B4
2992	B3
2993	A7
2994	A5
2995	A6
2996	A2
2997	A1
2998	A7
2999	A3
3959	A2
3960	A1
3961	E3
3962	E2
3963	E3
3964	E2
3965	D3
3966	D2
3967	C7
3968	C3
3969	C7
3970	C3
3971	C5
3972	C1
3973	C3
3974	C3
3975	C7
3976	C4
3977	B7
3978	B3
3979	B3
3980	B3
3981	B8
3982	B7
3983	B6
3984	B4
3985	B2
3986	A3
3987	A1
3988	A7
3989	A3
3990	A6
3991	A5
3992	A2
3993	A1
3994	A7
3995	A3
3996	A6
3997	A5
6950	A1
6951	C1
6953	B4
6954	C3
6955	C4
6956	C3
6957	A5
6958	B5
6959	C5
6960	B8
6961	C8
6962	C8

Layout Large Signal Panel (Top Side)

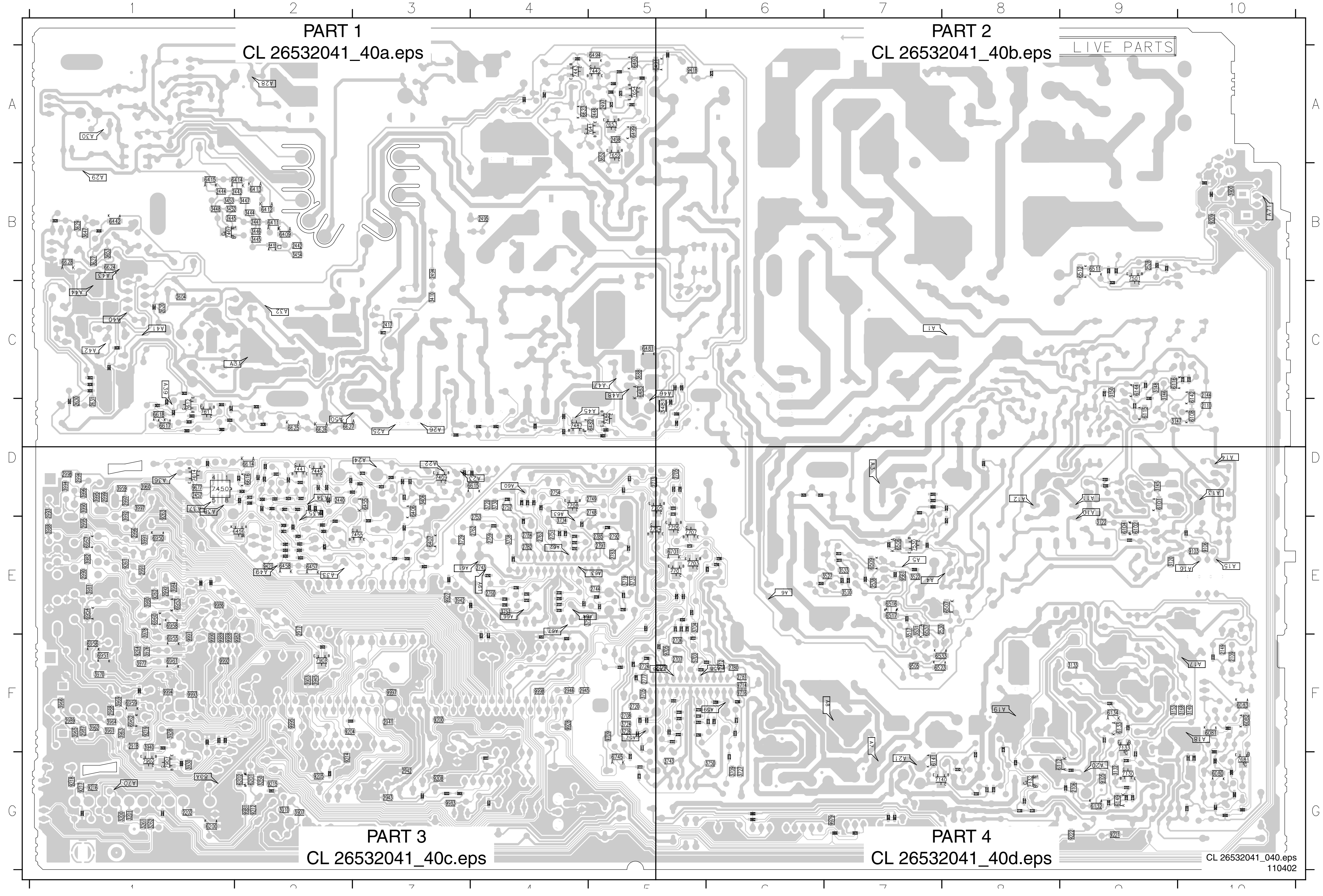
0042	C8
0043	D5
0044	E7
0045	F5
1146	G2
1148	G3
1149	F2
1200	G10
1201	G6
1205	F8
1417	B8
1424	A10
1430	C9
1491	A7
1492	A10
1493	A8
1495	C10
1498	A10
1499	D9
1500	A2
1501	B2
1502	A3
1503	C3
1505	A2
1510	E5
1550	B3
1590	A3
1601	G1
1620	F1
1625	B10
1627	B10
1693	D9
1735	G5
1737	F7
1738	F7
1901	E10
1902	F10
1932	E8
1933	E10
1934	F10
1935	F9
1936	F7
1937	G7
1940	F9
1943	G10
1945	G5
1946	G5
1947	G4
1948	G8
1949	G2
1950	B1
1951	F7
1952	G9
1953	E7
1955	G8
1961	G7
1965	E9
1966	F8
1997	G10
2100	F3
2101	D2
2102	E2
2104	F3
2107	F3
2108	C2
2111	D1
2114	C2
2115	E2
2116	F1
2118	F2
2119	F3
2120	G2
2121	E2
2122	E2
2124	C2
2126	G2
2140	G3
2141	F2
2143	F2
2148	F1
2152	E3
2200	G9
2203	G9
2400	B6
2401	A7
2402	A10
2405	A7
2413	D8
2418	C8
2419	C7
2420	C8
2421	B6
2422	A5
2423	A6
2424	C5
2425	C7
2426	C6
2430	B7
2431	B7
2432	B6
2433	B6
2434	B6
2435	C8
2450	A10
2451	D10
2460	A10
2461	A10
2462	C10
2463	C9
2464	C10
2465	C9
2468	A9
2469	A8
2487	A7
2488	C8
2490	D6
2491	A6
2492	E8
2501	D4
2503	E3
2505	D5
2506	E5
2507	A2
2508	C5
2509	B5
2510	D3
2511	G5
2512	G4
2515	D4
2516	B4
2517	C4
2518	D3
2519	F4
2520	A3
2522	F4
2523	D4
2531	E4
2537	B4
2540	F4
2541	C3
2542	G5
2543	F5
2622	C10
2624	B10
2625	B10
2627	B10
2628	D10
2642	A6
2717	G5
2729	G6
2740	E7
2758	E7
2778	D6
2900	B1
2914	F10
2915	E9
2940	F7
2947	G2
2948	F7
2949	F7
3101	C2
3102	D2
3103	D2
3104	D2
3105	E2
3106	E1
3107	E2
3108	C2
3110	C2
3111	D2
3113	E2
3114	E1
3115	G1
3116	G2
3117	D2
3118	C2
3124	F1
3125	D1
3126	E1
3127	E1
3137	G1
3141	G3
3144	F2
3161	F2
3162	F2
3170	G2
3171	G2
3400	A9
3401	A7
3402	A7
3403	A7
3409	C9
3411	D8
3415	D8
3416	E8
3417	C8
3418	C6
3423	C7
3425	C6
3426	C6
3431	B7
3435	B6
3436	B5
3449	E9
3450	A10
3451	B10
3460	A10
3461	A10
3462	C9
3463	C9
3464	C9
3465	C9
3469	A10
3476	A7
3478	C6
3479	C6
3480	C6
3488	C5
3492	D7
3493	C6
3495	A6
3498	C10
3499	C10
3500	A4
3501	A4
3505	E3
3507	E5
3508	D4
3509	B2
3511	D3
3513	C3
3514	E4
3515	D5
3516	C3
3518	C3
3520	E4
3521	A2
3526	E5
3533	F4
3536	A4
3537	D5
3540	E4
3542	E5
3543	D3
3550	C4
3551	A3
3620	C10
3621	C10
3622	C10
3623	C10
3624	B10
3625	C10
3626	C10
3628	D9
3634	C10
3635	C9
3641	D10
3642	B10
3645	A7
3661	C10
3663	C10
3681	G1
3687	G1
3689	A8
3711	F6
3713	E6
3728	F6
3747	E6
3749	D7
3755	E6
3904	E9
3941	F10
3967	F10
3968	F10
3971	F10
3972	F10
3973	F10
3974	E10
3975	F10
3979	E10
3983	E10
3985	E10
3986	E10
3987	E10
3989	E10
3993	D10
3998	C1
5100	E2
5102	D1
5103	F3
5104	E2
5105	F2
5106	E1
5111	F2
5112	F2
5113	D2
5130	F2
5400	C5
5401	A7
5402	B8
5410	D9
5411	C8
5421	B7
5422	A6
5423	C7
5424	A6
5425	C7
5426	C8
5430	B10
5461	A10
5463	C9
5465	C8
5466	A8
5467	C6
5469	A8
5502	A5
5503	A3
5504	A3
5505	D4
5506	E5
5507	F4
5509	F5
5511	A4
5513	G5
5514	G4
5515	A3
5516	A5
5620	B10
5621	D10
5701	F6
5702	F6
5707	G6
5708	F6
5711	G5
5712	F6
5715	E7
5716	E6
5720	E7
5721	E6
5722	D7
5723	D7
5725	E5
5901	G9
5902	G3
5903	G1
6103	D2
6105	D2
6106	D1
6107	F3
6109	C2
6110	E2
6111	F3
6113	F2
6114	D2
6120	F1
6121	E1
6122	F1
6130	F2
6147	D3
6148	F2
6400	A9
6405	A7
6408	E8
6421	D8
6422	D7
6423	C7
6434	B6
6435	C6
6460	A10
6462	C9
6463	C9
6464	C9
6465	C9
6480	C7
6505	D4
6510	C3
6514	D5
6515	D5
6525	D5
6530	D3
6534	D3
6535	F3
6536	G4
6619	B10
6620	C10
6621	C10
6622	C10
6900	B1
7100	D1
7101	C2
7102	D3
7103	E1
7104	E1
7105	C1
7120	E2
7131	F3
7141	G4
7408	D8
7421	D8
7440	D9
7480	D6
7482	D8
7483	D7
7502	E3
7504	D4
7506	E4
7507	E4
7528	B2
7529	F4
7613	D9
7620	C10
7680	F1
7682	G1
7700	F6
7702	E6
7910	G6
7911	G9
7912	G9
9101	C2
9102	F3
9110	C2
9112	F2
9114	D2
9117	E2
9118	G2
9119	G2
9120	G2
9121	G3
9122	F2
9123	E3
9124	F2
9125	G2
9126	G3
9127	E2
9260	F10
9401	B7
9402	B5
9403	C5
9404	C5
9405	E9
9406	B7
9408	C10
9409	A10
9410	A8
9411	A10
9412	E8
9413	E9
9414	E9
9415	E9
9423	C7
9425	C6
9426	C8
9501	A2
9502	A2
9503	B4
9504	B5
9510	D4
9511	C4
9513	B5
9516	A3
9517	E4
9518	C3
9519	B4
9551	C4
9552	F4
9554	C4
9556	E5
9557	E4
9558	E3
9563	E5
9564	C3
9566	E4
9567	B4
9570	F5
9571	F5
9620	C10
9622	C10
9623	C9
9650	C10
9651	C10
9652	A10
9655	A10
9656	A10
9658	C8
9659	B6
9660	B6
9661	B5
9663	B5
9664	C10
9665	C8
9666	C8
9667	C7
9669	D8
9670	C7
9671	B6
9674	A8
9675	A10
9701	E6
9703	E6
9708	D7
9712	E6
9715	D6
9718	E6
9719	E6
9720	E6
9721	D6
9901	G7
9902	G8
9903	G8
9906	G10
9907	G7
9909	G6
9910	E8
9911	E8
9912	E8
9913	E8
9914	E8
9915	E9
9916	E8
9917	E8
9918	E10
9919	E9
9920	E9
9921	E9
9922	E10
9923	E10
9924	E9
9925	F10
9926	F10
9929	G9
9930	G8
9931	F9
9932	G9
9933	F10
9934	F9
9935	G9
9936	G9
9937	G8
9938	G9
9939	F8
9940	G9
9941	G8
9942	F7
9943	G8
9944	G8
9945	G8
9946	G9
9947	G8
9948	F8
9949	F7
9950	F7
9951	G1
9952	G6
9953	G6
9954	F8
9955	G6
9956	G6
9957	B1
9958	B1
9959	F9
9961	F8
9963	G10
9964	G4
9965	G4
9967	G6
9968	F8
9969	F9
9971	G10
9972	G10
9974	G6
9975	G4
9976	B1
9977	E9
9980	G6
9982	F8
9996	F7



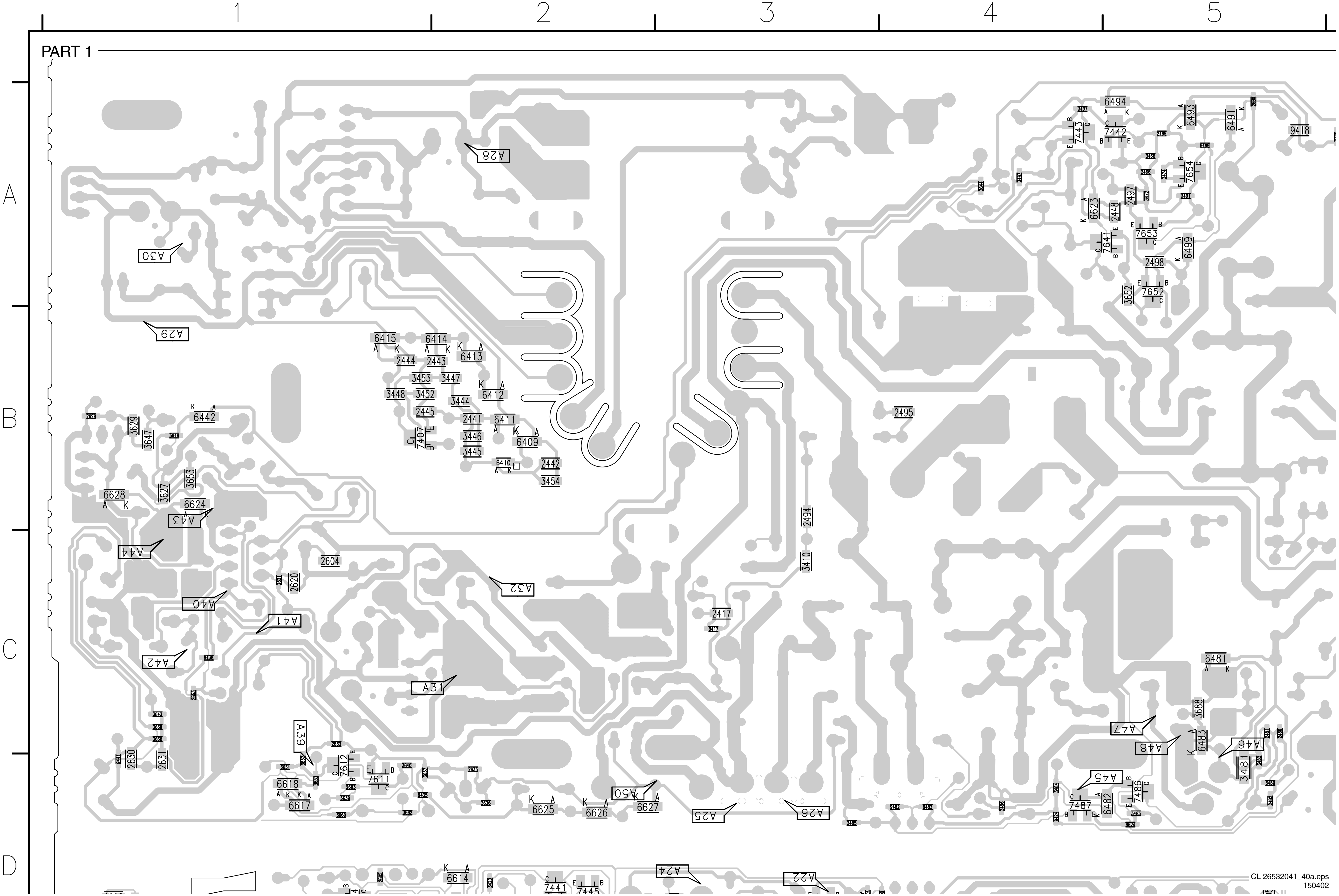
CL 26532041_039.eps
220402

Layout Large Signal Panel (Overview Bottom Side)

2103	D9
2105	D9
2106	G9
2109	F10
2110	D10
2112	D9
2123	C10
2130	G8
2131	G9
2144	C10
2145	C9
2147	G8
2149	F10
2150	G9
2153	E10
2154	F9
2201	G1
2202	G1
2403	D2
2404	D2
2409	D3
2412	D3
2414	D3
2415	D3
2417	C3
2440	D2
2441	B2
2442	B2
2443	B2
2444	B1
2445	B1
2448	A5
2454	E2
2455	F2
2457	D1
2458	E3
2466	A5
2480	C5
2481	C5
2482	D5
2493	E2
2494	B3
2495	B4
2497	A5
2498	A5
2499	A5
2502	E7
2504	D8
2513	E7
2514	E7
2524	E7
2525	E7
2528	B9
2530	E7
2535	D6
2538	E7
2544	D7
2601	F10
2603	D1
2604	C1
2605	D1
2620	C1
2621	C1
2623	D2
2629	B1
2630	D1
2631	D1
2633	C1
2635	D2
2653	C1
2656	D2
2657	D2
2659	D2
2660	A5
2702	E5
2704	E5
2705	D5
2706	F5
2707	F5
2708	F5
2709	F6
2710	F6
2711	F5
2712	F6
2713	D5
2714	F6
2715	F6
2716	F5
2718	F5
2719	G6
2720	F5
2721	F5
2722	F5
2723	E4
2724	F5
2725	E5
2726	F5
2727	F5
2728	F5
2741	E4
2742	E4
2743	E4
2744	E5
2745	E4
2746	E5
2747	E4
2748	D5
2749	D5
2750	E4
2751	E4
2753	E4
2754	D4
2755	D4
2756	E4
2757	D4
2759	E4
2760	E4
2761	E5
2762	E4
2763	E4
2777	F5
2779	F5
2780	F6
2781	F6
2782	E4
2783	E5
2784	E4
2785	E5
2786	F6
2787	E5
2788	F5
2789	F5
2790	F5
2791	E5
2792	E5
2794	E4
2795	D4
2796	E4
2797	E4
2798	E5
2916	F1
2917	E2
2918	F1
2929	E4
2941	F3
2942	G3
2943	G3
2945	F4
2946	F4
2950	G1
2951	G2
2985	F1
2987	F1
2988	F1
2989	F1
2990	E1
2991	E1
2992	E1
2993	D1
2994	D1
2995	E1
2996	E1
2997	D1
2998	D1
2999	D1
3109	G10
3120	E9
3121	E9
3122	E9
3123	F10
3130	F9
3131	F9
3132	G9
3133	F9
3134	G8
3135	G9
3136	F8
3140	F10
3142	G8
3143	G8
3145	D9
3146	C9
3147	D9
3148	C9
3149	C10
3150	C9
3151	G9
3152	C9
3153	F9
3155	G8
3156	G9
3157	G8
3158	G9
3159	G8
3160	C9
3164	G9
3165	G9
3166	G10
3167	G10
3168	F10
3200	G1
3201	G1
3250	G2
3261	G1
3262	G1
3404	D3
3406	D3
3407	D3
3410	C3
3412	D2
3414	D3
3419	D2
3420	D2
3421	D2
3422	D2
3440	E2
3441	D2
3442	D2
3443	D2
3444	B2
3445	B2
3446	B2
3447	B2
3448	B1
3452	B1
3453	B1
3454	B2
3455	D2
3456	D2
3457	D2
3458	E3
3459	E3
3466	A5
3467	A4
3472	A5
3474	A5
3475	A6
3481	D5
3482	D5
3483	D5
3484	D4
3485	D3
3486	D2
3487	E2
3489	D5
3490	D4
3491	A5
3496	D4
3497	A4
3504	E7
3506	E7
3510	E7
3512	D8
3517	E7
3519	E7
3522	E7
3523	E7
3524	B9
3525	E7
3527	E7
3528	C9
3529	B9
3530	E7
3531	E7
3532	B9
3534	B9
3535	D6
3547	E8
3549	E6
3552	D7
3553	D7
3610	D2
3611	E2
3627	B1
3629	B1
3630	C1
3631	D1
3632	D1
3633	D1
3636	D2
3637	D1
3638	C1
3639	D1
3640	D1
3643	C1
3644	A4
3646	B1
3647	B1
3652	A5
3653	B1
3654	E2
3655	D2
3656	E2
3657	D2
3658	E2
3659	D2
3660	D1
3662	D1
3682	G10
3683	G10
3684	F10
3685	G10
3686	G10
3688	C5
3701	E5
3702	E5
3703	D5
3704	E5
3705	F5
3706	F5
3707	F5
3708	F6
3709	G6
3710	F5
3712	F6
3714	E5
3715	D5
3716	D5
3717	G5
3718	G5
3719	E5
3720	D4
3721	F5
3722	F5
3723	F5
3724	F5
3725	F5
3726	F5
3727	G6
3729	E3
3730	D4
3731	E5
3732	E4
3733	E4
3734	E4
3735	E4
3736	E5
3737	E4
3738	E4
3739	E4
3740	E4
3741	E4
3742	E4
3743	G5
3744	E4
3745	G5
3746	E6
3748	D5
3750	G6
3751	E4
3752	E4
3790	E5
3791	F5
3792	E5
3793	F5
3794	D4
3795	D4
3796	D4
3797	E4
3798	E6
3900	B10
3901	B10
3902	B10
3903	F2
3907	G2
3910	G2
3928	F1
3929	F1
3930	G1
3938	F1
3939	F1
3940	F1
3942	E3
3943	F2
3945	F2
3959	D1
3960	D1
3961	F1
3962	F1
3963	F1
3964	F1
3965	F1
3966	F1
3969	F1
3970	F1
3976	F1
3977	F1
3978	E1
3980	E1
3981	E1
3982	E1
3984	E1
3988	E1
3990	D1
3991	E1
3992	D1
3994	D1
3995	D1
3996	D1
3997	D1
5703	F5
6080	G10
6081	F10
6082	F10
6083	F10
6101	D9
6102	E9
6104	E9
6108	D10
6112	G9
6115	D9
6116	C9
6132	G9
6133	F9
6134	F9
6141	G7
6142	C10
6144	C9
6149	G9
6200	G1
6201	G2
6202	G2
6406	D3
6407	E3
6409	B2
6410	B2
6411	B2
6412	B2
6413	B2
6414	B2
6415	B1
6442	B1
6455	D3
6456	E1
6457	E2
6458	E2
6481	C5
6482	D5
6483	C5
6491	A5
6493	A5
6494	A5
6499	A5
6506	E7
6507	E7
6509	E7
6511	B9
6512	C9
6516	E7
6517	E7
6523	F7
6533	F8
6537	E7
6614	D2
6615	D3
6616	D2
6617	D1
6618	D1
6623	A5
6624	B1
6625	D2
6626	D2
6627	D2
6628	B1
6701	E5
6745	G5
6950	E1
6951	F1
6953	E1
6954	E1
6955	E1
6956	F1
6957	E1
6958	E1
6959	F1
6960	E1
6961	F1
6962	F1
7130	G9
7132	G8
7133	F9
7140	G7
7407	B1
7409	D3
7441	D2
7442	A5
7443	A4
7445	D2
7450	D1
7455	E3
7486	D5
7487	D4
7501	C9
7530	E7
7611	D1
7612	C1
7614	D1
7641	A4
7652	B5
7653	A5
7654	A5
7681	G10
7701	E5
7703	E5
7704	E5
7705	D5
7706	E5
7707	E5
7708	D4
7901	G1
7902	F1
7908	F2
9103	E10
9105	G9
9106	E10
9128	G8
9200	F3
9201	G4
9203	G3
9204	F2
9205	G2
9206	G2
9207	G3
9208	G3
9209	B10
9210	F4
9211	F4
9212	G2
9213	G4
9214	G2
9215	G2
9216	G1
9217	G1
9218	G1
9219	F1
9221	G9
9222	G9
9250	F
9251	F
9261	E
9262	E
9263	D
9264	F
9417	C
9418	A
9421	E
9422	E
9424	D
9427	E
9428	D
9429	E
9430	E
9431	D
9432	E
9433	D
9434	D
9435	D
9436	D
9437	E
9438	C
9440	G
9441	D
9443	D
9481	E
9482	D
9483	D
9499	A
9505	F
9560	D
9561	E
9621	C
9624	D
9676	E
9677	D
9702	E
9705	F
9706	E
9707	E
9709	F
9711	D
9713	D
9714	F
9716	F
9717	F
9904	G
9905	E
9908	G
9927	E
9928	F
9960	G
9962	G
9966	G
9970	G
9973	G
9978	G
9979	G
9981	G
9983	G
9984	E
9985	E
9986	E
9987	F
9988	F
9989	F
9990	F
9991	F
9992	F
9993	F
9994	F
9995	F
9997	F
9998	F

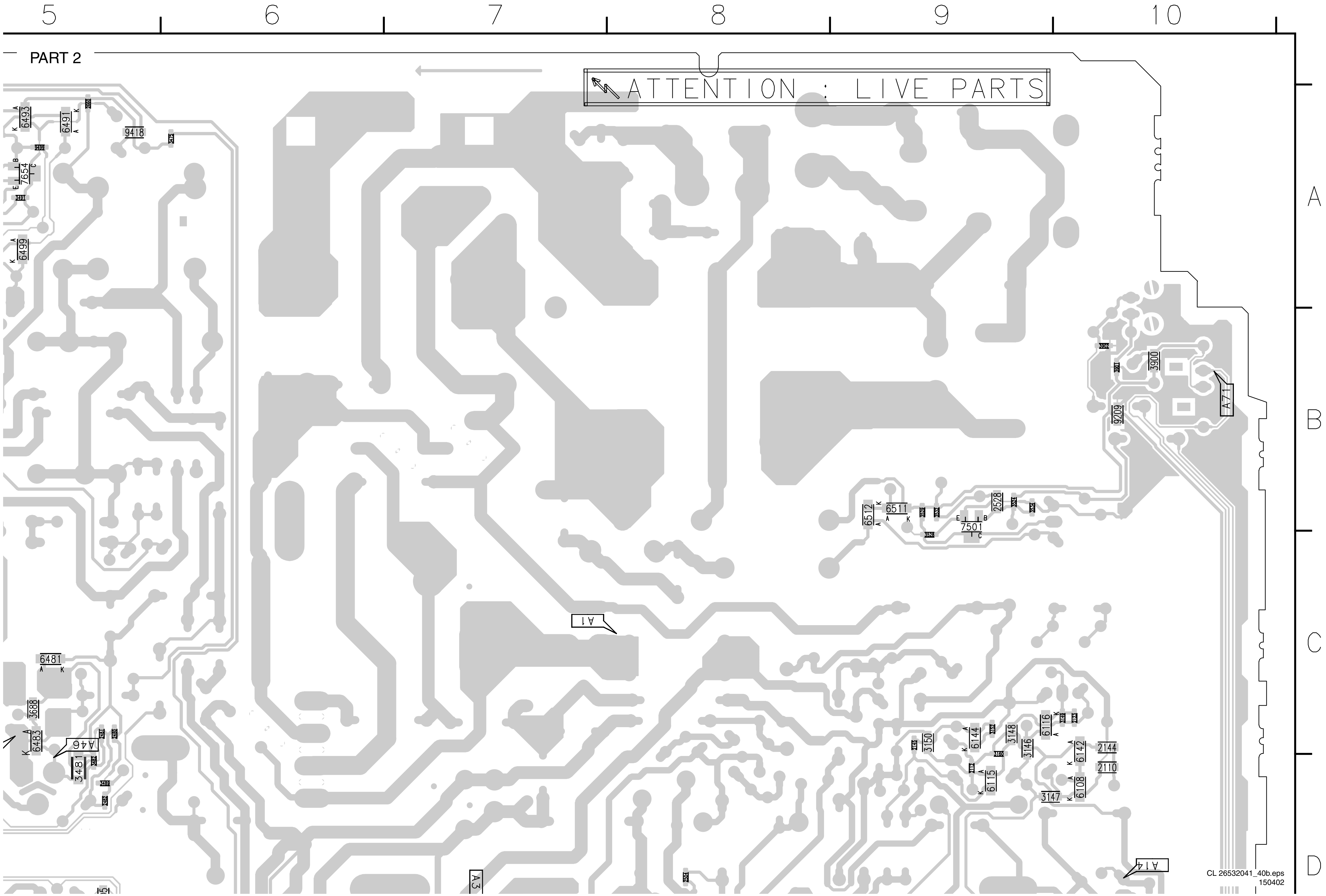


Layout Large Signal Panel (Part 1 Bottom Side)


1
2
3
4
5
A
B
C
D
PART 1
A28
A30
A29
A43
A44
A40
A41
A42
A32
A31
A39
A50
A25
A26
A24
A22
A47
A48
A46
A45
6415
6414
6413
2444
2443
3453
3447
6412
3448
3452
3444
2445
2441
6411
3446
6409
3445
7407
6410
2442
3454
6442
3629
3647
3653
3627
6628
6624
2604
2620
2417
2494
3410
2495
2630
2631
7612
7611
6618
6617
6625
6626
6627
6614
7441
7445
6494
7443
7442
6493
6491
9418
7654
6623
2448
2497
7641
7653
6499
2498
3652
7652
6481
3688
6483
3481
7487
6482
7486

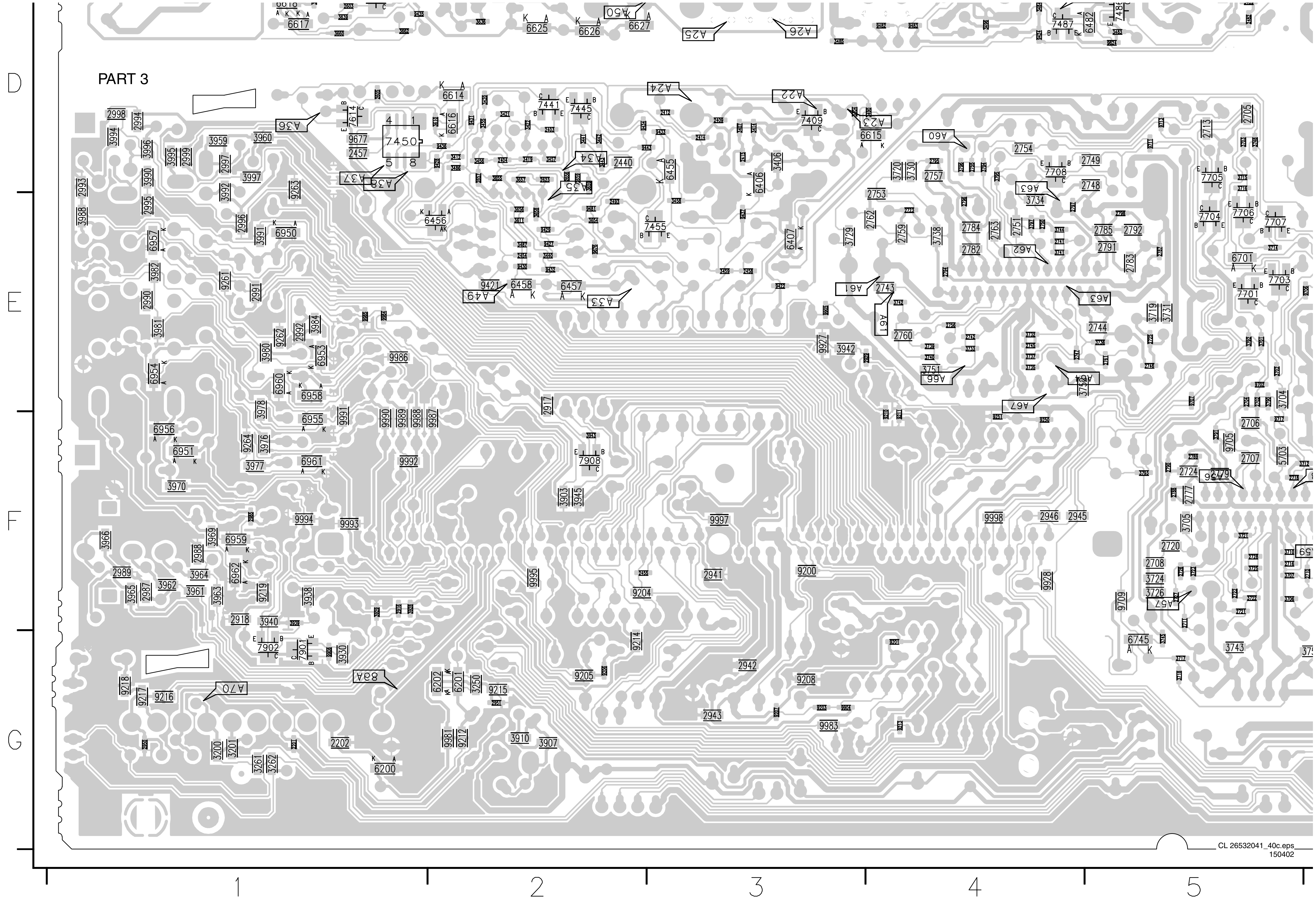
CL 26532041_40a.eps
150402

Layout Large Signal Panel (Part 2 Bottom Side)

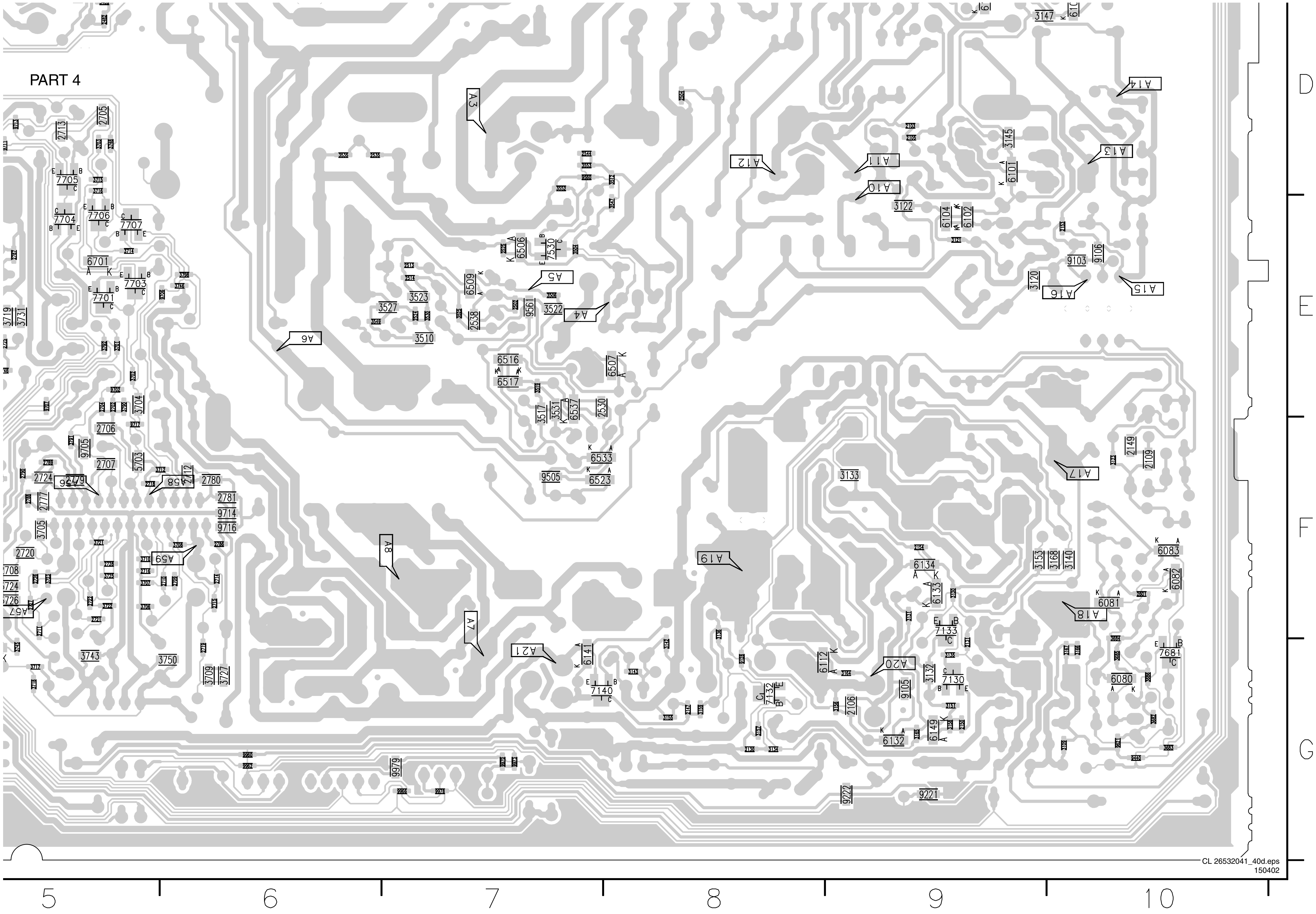

5
6
7
8
9
10
A
B
C
D
PART 2
ATTENTION : LIVE PARTS
6493
6491
9418
7654
6499
6481
3688
6483
A46
3481
A1
A3
6512
6511
7501
2528
3900
9209
A71
3150
6144
3148
6116
3146
6142
2144
2110
6115
6108
3147
A14

CL 26532041_40b.eps
150402

Layout Large Signal Panel (Part 3 Bottom Side)


PART 3
D
E
F
G
1
2
3
4
5
7450
6614
7441
7445
7409
6615
6616
7614
9677
2457
2440
6455
6406
3406
6456
7455
6407
6950
6957
6954
6956
6951
3970
6958
6955
6961
6953
6960
9986
9990
9989
9988
9987
9991
9992
9994
9993
6959
6962
3962
3964
3961
3963
3938
3940
2918
7902
7901
3930
9218
9217
9216
3200
3201
3261
3262
2202
6200
6202
6201
3250
9215
9981
9212
3910
3907
9205
9214
9204
9995
2941
2942
2943
9200
9208
9983
9997
3903
3945
7908
2917
9421
6458
6457
9927
3942
9928
9998
2946
2945
9709
6745
3743
2754
2749
7708
2748
3734
2757
2753
2762
2759
3738
2784
2782
2763
2751
2785
2792
2791
2783
3729
3720
3730
2743
2760
2744
3751
3752
3719
3731
7705
7704
7706
7707
6701
7703
7701
2713
2705
3704
2706
9705
2707
5703
2724
2779
2777
3705
2720
2708
3724
3726
2998
2994
3994
3996
3990
2995
2993
3988
3995
2999
3959
3960
2997
3997
3992
9263
2996
3991
3982
2990
3981
9261
2991
3980
9262
2992
3984
3978
9264
3976
3977
3966
2989
3965
2987
2988
3969
9219
6617
6625
6626
6627
7487
6482
A22
A23
A24
A25
A26
A33
A34
A35
A36
A37
A38
A49
A50
A56
A57
A60
A61
A62
A63
A64
A66
A67
A68
A70
CL 26532041_40c.eps
150402

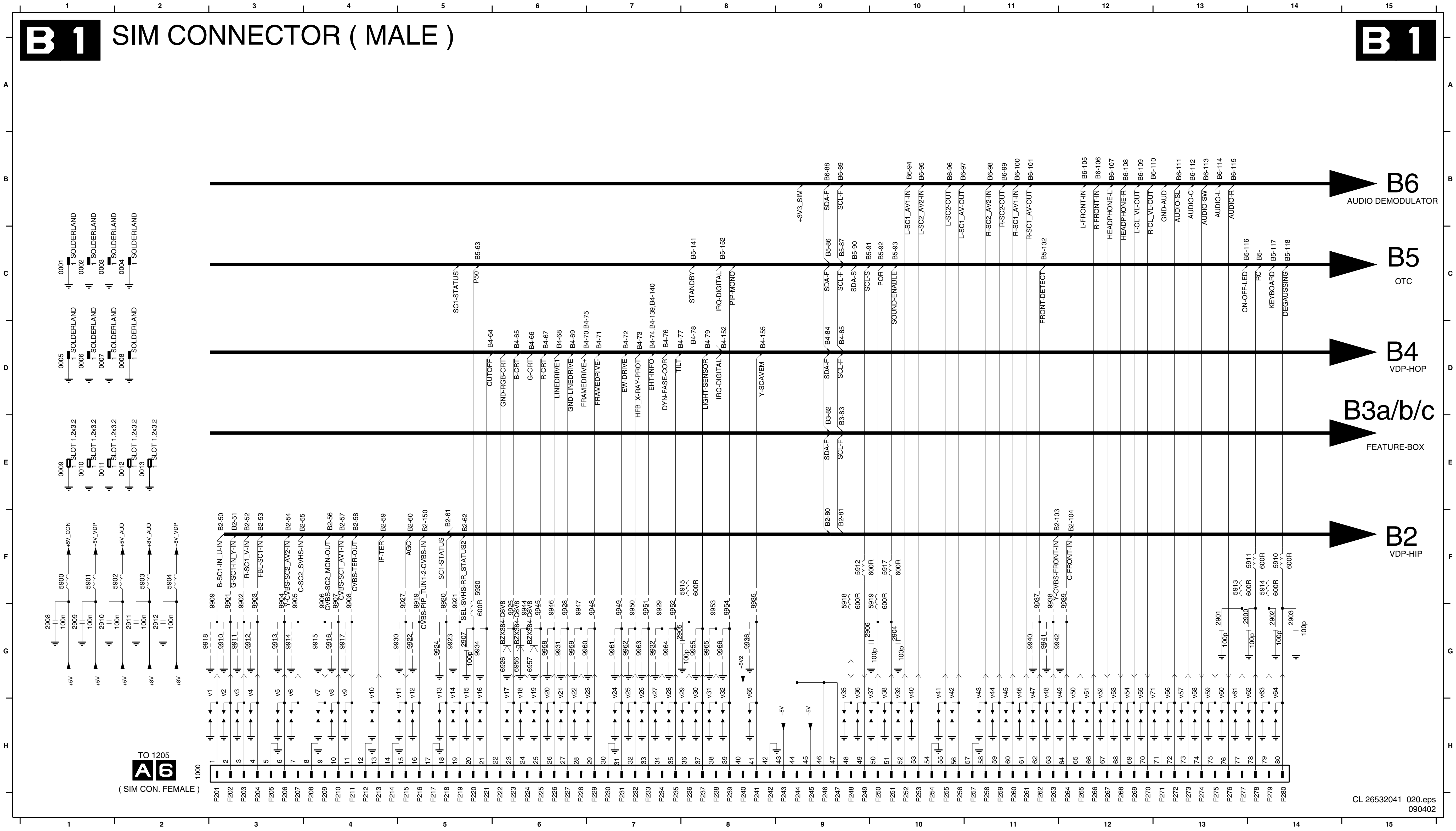
Layout Large Signal Panel (Part 4 Bottom Side)


PART 4
2713
2705
7705
7704
7706
7707
6701
7703
7701
3719
3731
3704
2706
9705
2707
5703
2724
2779
A56
A58
2712
2780
2781
9714
9716
2777
3705
2720
2708
3724
3726
A57
A59
3743
3750
3709
3727
A3
A6
3527
3523
3510
6509
2538
9561
3522
A5
A4
6506
7530
6516
6517
6507
3517
3531
6537
2530
6533
9505
6523
A8
A7
A21
6141
7140
9979
A12
A11
A10
3122
6104
6102
3145
6101
A13
A14
3147
9103
9106
3120
A16
A15
3133
A17
2149
2109
A19
6134
6133
7133
6112
A20
3132
7130
9105
2106
7132
6149
6132
9222
9221
3153
3168
3140
6083
6082
6081
A18
7681
6080
D
E
F
G
5
6
7
8
9
10

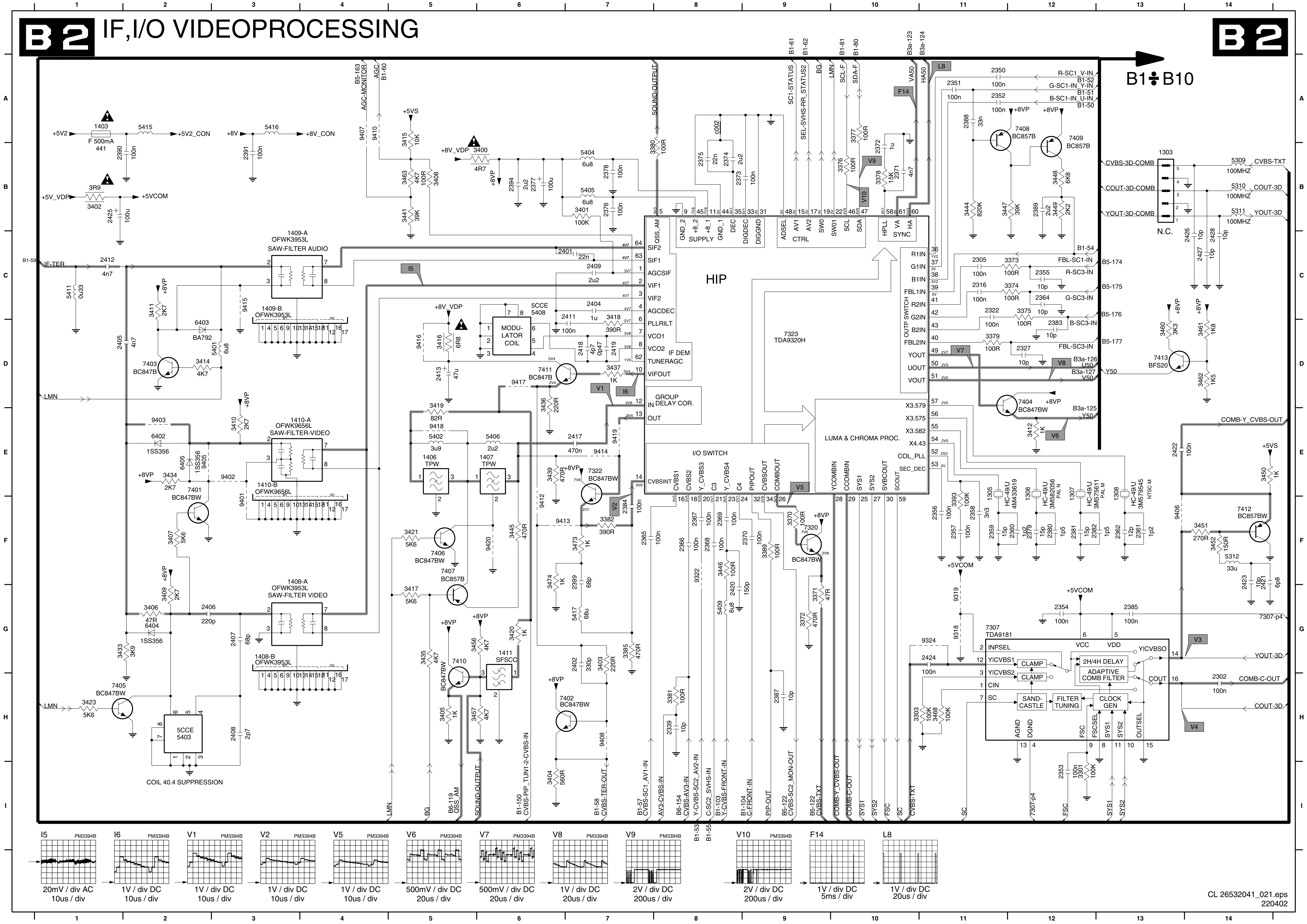
CL 26532041_40d.eps
150402

Small Signal Board: SIM Connector (Male)

v1	G3
v2	G3
v3	G3
v4	G3
v5	G3
v6	G3
v7	G4
v8	G4
v9	G4
v10	G4
v11	G5
v12	G5
v13	G5
v14	G5
v15	G5
v16	G5
v17	G6
v18	G6
v19	G6
v20	G6
v21	G6
v22	G6
v23	G7
v24	G7
v25	G7
v26	G7
v27	G7
v28	G7
v29	G8
v30	G8
v31	G8
v32	G8
v35	G9
v36	G9
v37	G10
v38	G10
v39	G10
v40	G10
v41	G10
v42	G10
v43	G11
v44	G11
v45	G11
v46	G11
v47	G11
v48	G11
v49	G12
v50	G12
v51	G12
v52	G12
v53	G12
v54	G12
v55	G12
v56	G13
v57	G13
v58	G13
v59	G13
v60	G13
v61	G13
v62	G14
v63	G14
v64	G14
v65	G8
v71	G12
0001	C1
0002	C1
0003	C1
0004	C2
0005	D1
0006	D1
0007	D1
0008	D2
0009	E1
0010	E1
0011	E1
0012	E2
0013	E2
1000	H2
2900	G14
2901	G13
2902	G14
2903	G14
2904	G10
2905	G8
2906	G9
2907	G5
2908	G1
2909	G1
2910	G1
2911	G2
2912	G2
5900	F1
5901	F1
5902	F2
5903	F2
5904	F2
5910	F14
5911	F14
5912	F9
5913	F13
5914	F14
5915	F8
5917	F10
5918	F9
5919	F10
5920	F5
6926	G6
6956	G6
6957	G6
9901	F3
9902	F3
9903	F3
9904	F3
9905	F3
9906	F4
9907	F4
9908	F4
9909	F3
9910	G3
9911	G3
9912	G3
9913	G3
9914	G3
9915	G4
9916	G4
9917	G4
9918	G2
9919	F5
9920	F5
9921	F5
9922	G5
9923	G5
9924	G5
9925	G6
9927	F5
9928	G6
9929	G7
9930	G5
9931	G6
9932	G7
9934	G5
9935	F8
9936	G8
9937	F11
9938	F11
9939	F12
9940	G11
9941	G11
9942	G12
9944	G6
9945	G6
9946	G6
9947	G6
9948	G7
9949	G7
9950	G7
9951	G7
9952	G7
9953	G8
9954	G8
9955	G8
9958	G6
9959	G6
9960	G7
9961	G7
9962	G7
9963	G7
9964	G7
9965	G8
9966	G8

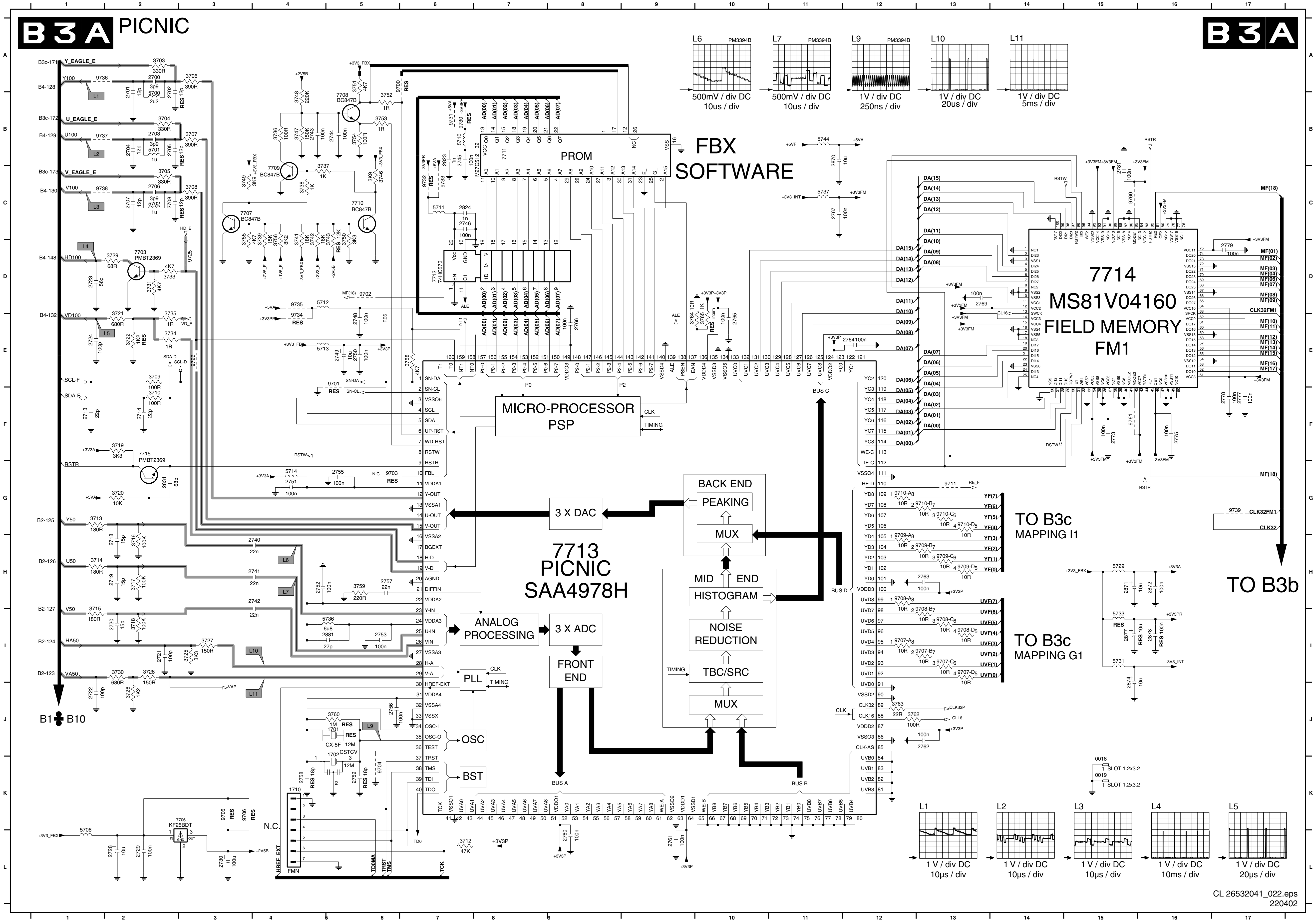

B 1
SIM CONNECTOR (MALE)
B 1
B6
AUDIO DEMODULATOR
B5
OTC
B4
VDP-HOP
B3a/b/c
FEATURE-BOX
B2
VDP-HIP
SOLDERLAND
SLOT 1.2x3.2
+5V_CON
+5V_VDP
+5V_AUD
+8V_AUD
+8V_VDP
100n
600R
100p
SC1-STATUS
P50
B5-63
CUTOFF
GND-RGB-CRT
B-CRT
G-CRT
R-CRT
LINEDRIVE1
GND-LINEDRIVE
FRAMEDRIVE+
FRAMEDRIVE-
EW-DRIVE
HFB_X-RAY-PROT
EHT-INFO
DYN-FASE-COR
TILT
STANDBY
LIGHT-SENSOR
IRQ-DIGITAL
PIP-MONO
Y-SCAVEM
+3V3_SIM
SDA-F
SCL-F
SDA-S
SCL-S
POR
SOUND-ENABLE
L-SC1_AV1-IN
L-SC2_AV2-IN
L-SC2-OUT
L-SC1_AV-OUT
R-SC2_AV2-IN
R-SC2-OUT
R-SC1_AV1-IN
R-SC1_AV-OUT
FRONT-DETECT
L-FRONT-IN
R-FRONT-IN
HEADPHONE-L
HEADPHONE-R
L-CL_VL-OUT
R-CL_VL-OUT
GND-AUD
AUDIO-SL
AUDIO-C
AUDIO-SW
AUDIO-L
AUDIO-R
ON-OFF-LED
RC
KEYBOARD
DEGAUSSING
B-SC1-IN_U-IN
G-SC1-IN_Y-IN
R-SC1_V-IN
FBL-SC1-IN
Y-CVBS-SC2_AV2-IN
C-SC2_SVHS-IN
CVBS-SC2_MON-OUT
CVBS-SC1_AV1-IN
CVBS-TER-OUT
IF-TER
AGC
CVBS-PIP_TUN1-2-CVBS-IN
SEL-SVHS-RR_STATUS2
BZX384-C6V8
Y-CVBS-FRONT-IN
C-FRONT-IN
TO 1205
A6
(SIM CON. FEMALE)
1000
CL 26532041_020.eps
090402

Small Signal Board: IF. I/O Video Processing


B2
IF,I/O VIDEOPROCESSING
B2
B1÷B10
HIP
7323
TDA9320H
IF DEM
GROUP DELAY COR.
I/O SWITCH
LUMA & CHROMA PROC.
OUTP SWITCH
SUPPLY
CTRL
SYNC
7307
TDA9181
CLAMP
2H/4H DELAY
ADAPTIVE COMB FILTER
SAND-CASTLE
FILTER TUNING
CLOCK GEN
1409-A OFWK3953L SAW-FILTER AUDIO
1409-B OFWK3953L
1410-A OFWK9656L SAW-FILTER-VIDEO
1410-B OFWK9656L
1408-A OFWK3953L SAW-FILTER VIDEO
1408-B OFWK3953L
5CCE 5408 MODU-LATOR COIL
5CCE 5403
COIL 40.4 SUPPRESSION
1406 TPW
1407 TPW
1411 SFSCC
1303
N.C.
+5V2
+5V2_CON
+8V
+8V_CON
+5V_VDP
+5VCOM
+8V_VDP
+8VP
+5VS
+5VCOM
IF-TER
LMN
SOUND-OUTPUT
QSS_AM
CVBS-TXT
COUT-3D
YOUT-3D
COMB-Y_CVBS-OUT
COMB-C-OUT
I5
I6
V1
V2
V3
V4
V5
V6
V7
V8
V9
V10
F14
L8
20mV / div AC 10us / div
1V / div DC 10us / div
1V / div DC 10us / div
1V / div DC 10us / div
1V / div DC 10us / div
500mV / div DC 20us / div
500mV / div DC 20us / div
1V / div DC 20us / div
2V / div DC 200us / div
2V / div DC 200us / div
1V / div DC 5ms / div
1V / div DC 20us / div
CL 26532041_021.eps
220402

1303	B13
1305	E11
1306	E12
1307	E12
1308	E13
1403	A1
1406	E5
1407	E6
1408-A	F4
1408-B	G3
1409-A	B4
1409-B	C3
1410-A	E4
1410-B	E3
1411	G6
2302	H14
2305	C11
2316	C11
2322	C11
2327	D12
2339	H8
2350	A11
2351	A11
2352	A11
2353	I12
2354	G12
2355	C12
2356	F11
2357	F11
2358	F11
2359	F11
2360	F12
2361	F13
2362	F13
2364	C12
2365	F7
2366	F8
2367	F8
2368	F8
2369	F8
2370	F9
2371	B10
2372	B10
2373	B8
2374	B8
2375	B8
2376	B7
2377	B6
2378	B7
2379	F12
2380	F12
2381	F12
2382	F13
2383	D12
2384	F7
2385	G13
2387	H9
2388	A11
2389	B12
2390	B1
2391	B3
2394	B6
2399	F7
2401	C7
2402	G7
2404	C7
2405	D1
2406	G2
2407	G3
2408	H3
2409	C7
2411	C7
2412	C1
2413	D5
2417	E7
2418	D7
2419	D7
2420	G8
2421	F14
2422	E13
2423	F14
2424	G11
2425	B1
2426	C14
2427	C14
2428	C14
3301	I12
3303	H10
3370	F9
3371	G9
3372	G9
3373	C12
3374	C12
3375	C12
3376	B10
3377	A10
3378	B10
3379	D11
3380	B8
3381	H8
3382	F7
3385	G7
3389	F9
3393	F11
3400	B6
3401	B7
3402	B1
3403	G7
3404	I6
3405	H5
3406	G2
3407	F2
3408	B5
3409	G2
3410	E3
3411	C2
3412	E12
3414	D2
3415	A5
3416	D5
3417	G5
3418	C7
3419	D5
3420	G6
3421	F5
3423	H1
3433	G1
3434	E2
3435	G5
3436	D6
3437	D7
3439	E6
3441	B5
3444	B11
3445	F6
3446	F8
3447	B11
3448	B12
3449	B12
3450	E14
3451	F14
3452	F14
3456	G5
3457	H5
3460	D13
3461	D14
3462	D14
3463	B5
3468	H11
3473	F7
3474	F6
5309	B14
5310	B14
5311	B14
5312	F14
5401	D3
5402	E5
5403	H2
5404	B7
5405	B7
5406	E6
5408	C6
5409	G8
5411	C1
5415	A2
5416	A3
5417	G7
6402	E2
6403	D2
6404	G2
6405	E2
7307	G11
7320	F9
7322	E7
7323	D9
7401	E2
7402	H7
7403	D2
7404	D12
7405	H1
7406	F5
7407	F5
7408	A12
7409	A12
7410	G5
7411	D6
7412	F14
7413	D13
9318	G11
9319	G11
9322	F8
9324	G11
9401	F3
9402	E3
9403	E2
9405	E2
9406	F13
9407	A4
9408	H7
9410	A4
9412	F6
9413	F6
9414	E7
9415	C3
9416	D5
9417	D6
9418	E5
9419	E7
9420	F6
c002	A8

Small Signal Board: PICNIC


B3A PICNIC
B3A
L6 PM3394B 500mV / div DC 10us / div
L7 PM3394B 500mV / div DC 10us / div
L9 PM3394B 1V / div DC 250ns / div
L10 1V / div DC 20us / div
L11 1V / div DC 5ms / div
FBX SOFTWARE
PROM
7711 M27C512
7712 74HC573
MICRO-PROCESSOR PSP
7713 PICNIC SAA4978H
3 X DAC
BACK END
PEAKING
MUX
MID END
HISTOGRAM
NOISE REDUCTION
TBC/SRC
MUX
ANALOG PROCESSING
3 X ADC
FRONT END
PLL
OSC
BST
BUS A
BUS B
BUS C
BUS D
7714 MS81V04160 FIELD MEMORY FM1
TO B3c MAPPING I1
TO B3c MAPPING G1
TO B3b
B1 B10
Y_EAGLE_E
U_EAGLE_E
V_EAGLE_E
Y100
U100
V100
HD100
VD100
Y50
U50
V50
HA50
VA50
SCL-F
SDA-F
RSTR
7703 PMBT2369
7707 BC847B
7708 BC847B
7709 BC847B
7710 BC847B
7715 PMBT2369
7706 KF25BDT
1701 CX-5F 12M
1702 CSTCV 12M
1710 FMN
HREF_EXT
TDOMA
TRST
TMS
TCK
N.C.
0018 SLOT 1.2x3.2
0019 SLOT 1.2x3.2
L1 1 V / div DC 10μs / div
L2 1 V / div DC 10μs / div
L3 1 V / div DC 10μs / div
L4 1 V / div DC 10ms / div
L5 1 V / div DC 20μs / div
CL 26532041_022.eps
220402

0018	K15
0019	K15
1701	J5
1702	K5
1710	K4
2700	A2
2701	B2
2702	B2
2703	B2
2704	B2
2705	B2
2706	C2
2707	C2
2708	C2
2713	F1
2714	F2
2718	H2
2719	H2
2720	I2
2721	I2
2722	J1
2723	D1
2724	E1
2728	L2
2729	L2
2730	L3
2740	H4
2741	H4
2742	H4
2743	B4
2744	B5
2745	B6
2746	C6
2748	E5
2749	E5
2750	E5
2751	G4
2752	H4
2753	I5
2755	G5
2756	J5
2757	H5
2758	K4
2759	K5
2760	L8
2761	L9
2762	J13
2763	H13
2764	E12
2765	E10
2766	E8
2767	C11
2769	D13
2773	F15
2775	F16
2777	F17
2778	F17
2779	D17
2781	C15
2823	B6
2824	C6
2831	G2
2870	B11
2871	H15
2872	H16
2874	J15
2877	I15
2878	I16
2881	I5
3703	A2
3704	B2
3705	C2
3706	A3
3707	B3
3708	C3
3709	E2
3710	F2
3712	L6
3713	G1
3714	H1
3715	I1
3716	H2
3717	H2
3718	I2
3719	F2
3720	G2
3721	E2
3722	E2
3725	I3
3726	J2
3727	I3
3728	I2
3729	D2
3730	I2
3731	D2
3733	D2
3734	E2
3735	E2
3736	B4
3737	C4
3738	C4
3739	C4
3741	C4
3742	C4
3743	C5
3746	C5
3747	B4
3748	B4
3749	C3
3750	C5
3751	A5
3752	B5
3753	B5
3754	B5
3755	C3
3756	D4
3758	E6
3759	H5
3760	J5
3762	J12
3763	J12
3764	E9
3765	E10
5700	B2
5701	B2
5702	C2
5706	L1
5710	B6
5711	C6
5712	D4
5713	E4
5714	G4
5729	H15
5731	I15
5733	I15
5736	I5
5737	C11
5744	B11
7703	D2
7706	K2
7707	C3
7708	B5
7709	C4
7710	C5
7711	B7
7712	D6
7713	H8
7714	D15
7715	F2
9700	A6
9701	E5
9702	D5
9703	G5
9704	K5
9705	K3
9706	K3
9707-A	I12
9707-B	I13
9707-C	I13
9707-D	I13
9708-A	H12
9708-B	I13
9708-C	I13
9708-D	I13
9709-A	H12
9709-B	H13
9709-C	H13
9709-D	H13
9710-A	G12
9710-B	G13
9710-C	G13
9710-D	G13
9711	G13
9725	D3
9726	E3
9730	B6
9731	B6
9732	C6
9733	C6
9734	E4
9735	D4
9736	A1
9737	B1
9738	C1
9739	G17
9760	C15
9761	F15

Small Signal Board: Diversity Tables

[B2] IF.I/O VIDEOPROCESSING

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1303					X	5p
1305	X	X	X	X		XTL 4.433619MHz
1406					X	Filter 4.5MHz TPSCC*MB BS
1406		X	X	X		Filter 5.5MHz/5.74MHz TPWCC04BS
1407		X	X	X		Filter 4.5MHz TPSCC*MB BS
1407	X					Filter 5.5MHz/5.74MHz TPWCC04BS
1408						Saw filter 38MHz OFWK3955L
1408	X					Saw filter 38.9MHz OFWK3953L
1409						Saw filter 38MHz OFWK9352L
1409		X	X	X		Saw filter 38.9MHz OFWK9361L
1409	X					Saw filter 38.9MHz OFWK9656L
1410					X	Saw filter 45.75MHz OFWM1967L
1410		X	X	X		Saw filter 38.9MHz OFWK7265L
1411					X	Filter 4.5MHz SFSCC*MCC BP
2305	X					100nF
2316	X					100nF
2322	X					100nF
2353	X	X	X	X		100nF
2354	X	X	X	X		100nF
2359	X	X	X	X		15pF
2360	X	X	X	X		1.2pF
2385	X	X	X	X		100nF
2388		X	X	X	X	33nF
2389		X	X	X	X	2.2 F
2399					X	47pF
2399				X		100pF
2399		X	X			68pF
2401					X	10nF
2404					X	2.2 F
2404	X	X	X	X		1 F
2406	X					220pF
2407	X					68pF
2408	X					2.7pF
2409	X	X	X	X		2.2 F
2413					X	47 F
2417	X	X	X	X		470nF
2418					X	12pF
2418	X	X	X	X		5.6pF
2424	X	X	X	X		100nF
3301	X	X	X	X		100kR
3303	X	X	X	X		100kR
3373	X					Jumper
3374	X					Jumper
3375	X					Jumper
3379	X					Jumper
3380	X	X	X	X		100R
3382		X	X	X	X	390R
3382	X					560R
3401					X	100kR
3406	X					27R
3407		X	X	X		5kR6
3409		X	X	X		4kR7
3410		X	X	X		4kR7
3411	X					2kR7
3414	X					4kR7

[B4] HOP

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1304		X	X	X	X	7p
2301			X			100nF
2303		X	X	X	X	10nF
2303	X					1uF
2312	X	X		X	X	33nF
2342		X	X	X	X	100nF
2395		X	X	X	X	100nF
2396		X	X	X	X	100nF
2397		X	X	X	X	100nF
2398			X			100nF
3305			X			22kR
3308		X	X		X	470kR
3308				X		220kR
3308	X					150kR
3329	X	X		X	X	6.8R
3329			X			3R9
3330		X	X	X	X	1kR
3332		X	X	X	X	1kR
3335		X	X	X	X	1kR
3339			X			Jumper
3355		X	X	X	X	33kR
3360		X	X	X	X	100kR
3387		X	X	X	X	100R
3395		X	X	X	X	100R
3396		X	X	X	X	100R
3397		X	X	X	X	100R
3398		X	X	X	X	100R
3453			X			10kR
3454			X			100R
3455			X			100R
3467		X	X	X	X	10kR
3470		X	X	X	X	33kR
3471		X	X	X	X	100kR
5303		X	X	X	X	Jumper
5304		X	X	X	X	Jumper
5305		X	X	X	X	Jumper
5306		X	X	X	X	Jumper
5307		X	X	X	X	Jumper
5308		X	X	X	X	Jumper
6308			X			BAS316
6320		X	X	X	X	BZX384-C6V8
6321		X	X	X	X	BZX384-C6V8
6322		X	X	X	X	BZX384-C6V8
7302			X			TDA9178T/N1
7305		X	X	X	X	SIGBC847BW
7312	X	X		X	X	SIGPDTC144EU
7375		X	X	X	X	SIGBC847BW
9302	X	X		X	X	Jumper
9303	X	X		X	X	Jumper
9304	X	X		X	X	Jumper

[B5] OTC

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1001	X	X	X	X	X	XTL 6.000MHz
2001	X	X	X	X	X	33pF
2002	X	X	X	X	X	27pF
2003	X	X	X	X	X	220nF
2004	X	X	X	X	X	220nF
2005	X	X	X	X	X	100nF
2006	X	X	X	X	X	100nF
2007	X	X	X	X	X	100nF
2008	X	X	X	X	X	100nF
2010	X	X	X	X	X	47pF
2011	X	X	X	X	X	47pF
2012	X	X	X	X	X	47pF
2013	X	X	X	X	X	100 F
2016	X	X	X	X	X	100 F
2016	X	X	X	X	X	100 F
2017	X	X	X	X	X	100nF
2019	X	X	X	X	X	100nF
2020	X	X	X	X	X	220pF
2022	X	X	X	X	X	100nF
2023	X	X	X	X	X	100nF
2024	X	X	X	X	X	100nF
2025	X	X	X	X	X	100nF
2026	X	X	X	X	X	100nF
2027	X	X	X	X	X	100nF
2028	X	X	X	X	X	100nF
2029	X	X	X	X	X	100nF
2031	X	X	X	X	X	100nF
2033	X	X	X	X	X	82pF
2034	X	X	X	X	X	82pF
2035	X	X	X	X	X	82pF
2036	X	X	X	X	X	82pF
2037	X	X	X	X	X	82pF
2038	X	X	X	X	X	100nF
2039	X	X	X	X	X	100nF
2040	X	X	X	X	X	100nF
3001	X	X	X	X	X	4.7kR
3002	X	X	X	X	X	4.7kR
3003	X	X	X	X	X	24kR
3006	X	X	X	X	X	470R
3007	X	X	X	X	X	4x470R
3008	X	X	X	X	X	4x150R

[B6] AUDIO DEMODULATOR

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1681				X	X	3p
1682				X	X	10p
2509	X	X		X	X	10 F
2546	X					10 F
2547	X					10 F
2551	X					3.3nF
2572	X	X		X	X	1nF
2573	X	X		X	X	1nF
2580	X					1nF
2581	X					1nF
2592	X	X		X	X	1nF
2600	X	X		X	X	1 F
2601	X	X		X	X	1 F
2602	X	X		X	X	1 F
2603	X	X		X	X	1 F
2604	X	X		X	X	1 F
2612				X		1 F
2629	X	X		X	X	330nF
2630	X	X		X	X	2.2 F
2632	X	X		X	X	330nF
2637	X	X		X	X	330nF
2697	X	X		X	X	100nF
2698	X	X		X	X	2.2 F
2699	X	X		X	X	2.2 F
3520	X	X		X	X	47kR
3528	X	X		X	X	10kR
3544	X	X		X	X	47kR
3545	X	X		X	X	1.2kR
3547	X	X		X	X	47kR
3551	X					1kR
3552	X	X		X	X	10kR
3553	X	X		X	X	22kR
3554	X	X		X	X	22kR
3555	X	X		X	X	22kR
3556	X	X		X	X	100R
3557	X	X		X	X	100R
3568	X					100R
3569	X					100R
3577	X	X		X	X	100R
3601	X	X		X	X	22kR
3602	X	X		X	X	120kR
3603	X	X		X	X	220kR
3604	X	X		X	X	120kR
3605	X	X		X	X	220kR
3606	X	X		X	X	120kR
3607	X	X		X	X	220kR
3608	X	X		X	X	120kR
3609	X	X		X	X	220kR
3612	X					47kR
3613	X					47kR
3616	X					2.7kR
3617				X		10kR
3618				X		10kR
3619				X		1kR
3624	X	X		X	X	1.2kR
3626	X	X		X	X	150kR
3627	X	X		X	X	10kR
3628	X	X		X	X	22kR

[B9] ANTI-MOIRE

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
2062				X		22nF
2063				X		47nF
2064				X		22nF
2065				X		100nF
2066				X		47nF
3022				X		39kR
3023				X		10kR
3028				X		4.7kR
3030				X		1.2kR
3032				X		470R
3036				X		2.7kR
3037				X		2.2kR
3038				X		10kR
3043				X		1.5kR
3060				X		2.7kR
3070				X		10kR
3071				X		10kR
6006				X		BAS316
6007				X		BAS316
7017				X		SIGBC847BW
7018				X		SIGBC847BW
7019				X		SIGBC847BW
7020				X		SIGBC847BW

[B3A] PICNIC

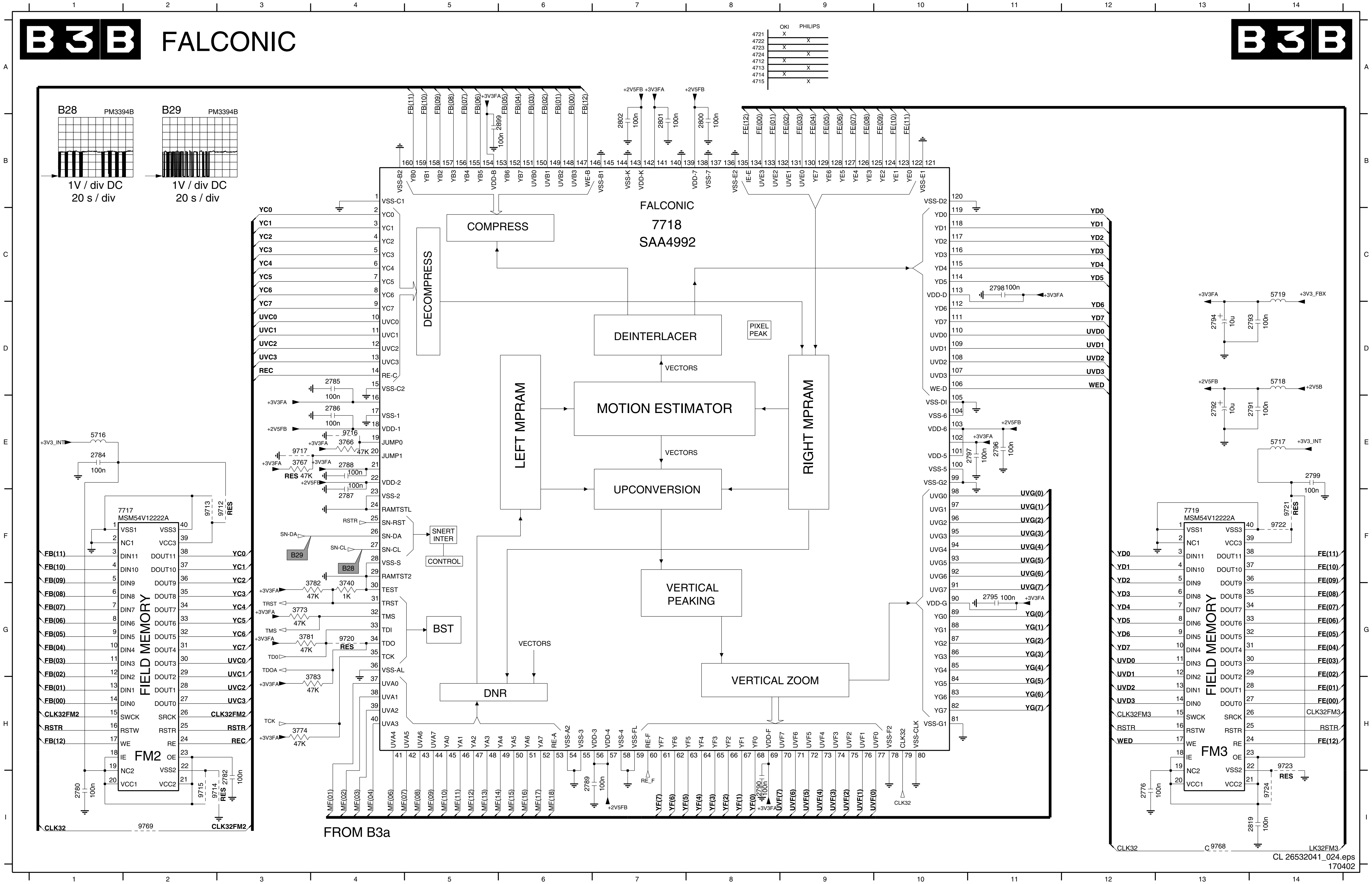
Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
2700			X			Jumper
2701	X	X		X	X	12pF
2703			X			Jumper
2704	X	X		X	X	12pF
2706			X			Jumper
2707	X	X		X	X	12pF
3703	X	X		X	X	330R
3704	X	X		X	X	330R
3705	X	X		X	X	330R
3706			X			390R
3707			X			390R
3708			X			390R
3734			X			1R
3735	X	X		X	X	1R
3736	X	X		X	X	100R
3737	X	X		X	X	1kR
3738	X	X		X	X	1kR
3739	X	X		X	X	15kR
3741	X	X		X	X	18kR
3742	X	X		X	X	18kR
3746	X	X		X	X	3.9kR
3749	X	X		X	X	3.9kR
3750	X	X		X	X	3.3kR
3755	X	X		X	X	4.7kR
3756	X	X		X	X	8.2kR
5700	X	X		X	X	2.2 H
5701	X	X		X	X	1 H
5702	X	X		X	X	1 H
7707	X	X		X	X	SIGBC847B
7709	X	X		X	X	SIGBC847B
7710	X	X		X	X	SIGBC847B
9707			X			4x10R
9708			X			4x10R
9709			X			4x10R
9710			X			4x10R
9711			X			Jumper
9725	X	X		X	X	Jumper
9726			X			Jumper

[B3C] EAGLE

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
2709	X	X		X	X	100nF
2710	X	X		X	X	100nF
2711	X	X		X	X	100nF
2712	X	X		X	X	100nF
2716	X	X		X	X	100nF
2717	X	X		X	X	12pF
2725	X	X		X	X	12pF
2726	X	X		X	X	27pF
2727	X	X		X	X	12pF
2731	X	X		X	X	100nF
2732	X	X		X	X	100nF
2733	X	X		X	X	100nF
2734	X	X		X	X	100nF
2735	X	X		X	X	100nF
2736	X	X		X	X	27pF
2737	X	X		X	X	12pF
2738	X	X		X	X	12pF
2739	X	X		X	X	27pF
2747	X	X		X	X	100nF
2754	X	X		X	X	100nF
2768	X	X		X	X	100nF
2770	X	X		X	X	10 F
2771	X	X		X	X	100nF
2772	X	X		X	X	100 F
2774	X	X		X	X	100nF
2783	X	X		X	X	100nF
2803	X	X		X	X	100nF
2804	X	X		X	X	100nF
2805	X	X		X	X	100nF
2807	X	X		X	X	100nF
2808	X	X		X	X	10 F
2809	X	X		X	X	100nF
2810	X	X		X	X	100nF
2811	X	X		X	X	100nF
2812	X	X		X	X	100nF
2813	X	X		X	X	100nF
2814	X	X		X	X	100nF
2815	X	X		X	X	2.2pF
2816	X	X		X	X	2.2pF
2817	X	X		X	X	100nF
2818	X	X		X	X	2.2pF
2820	X	X		X	X	100nF
2821	X	X		X	X	100nF
2822	X	X		X	X	100nF
2825	X	X		X	X	100nF
2826	X	X		X	X	100nF
2827	X	X		X	X	100nF
2828	X	X		X	X	100nF
2829	X	X		X	X	100nF
2830	X	X		X	X	100nF
2832	X	X		X	X	100nF
2833	X	X		X	X	100nF
2835	X	X		X	X	100nF
2838	X	X		X	X	100nF
2843	X	X		X	X	100nF
2845	X	X		X	X	100nF
2846	X	X		X	X	100nF
2847	X	X		X	X	100nF

CL 26532041_023.eps
220402

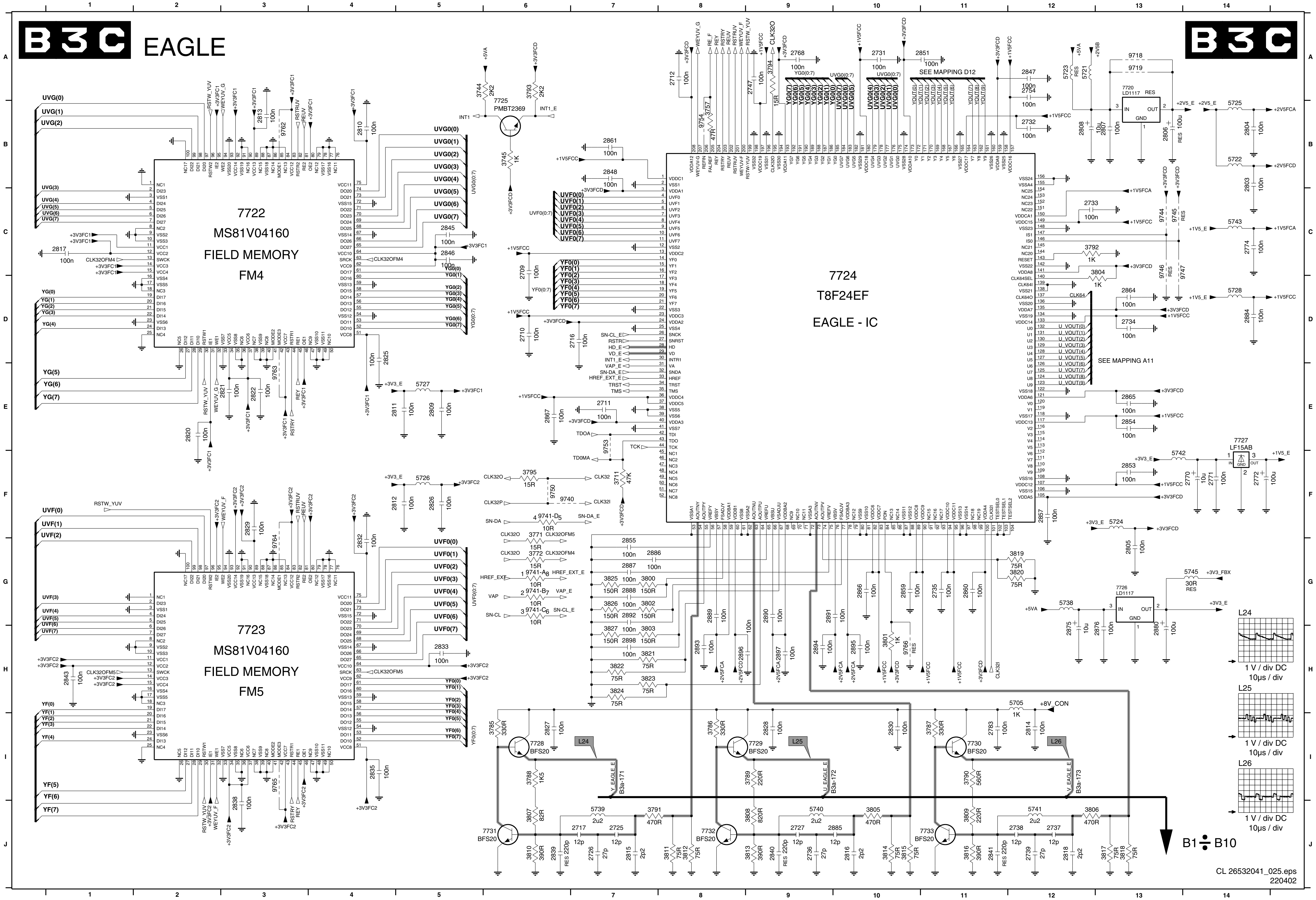
Small Signal Board: Falconic


B3B
FALCONIC
B3B
B28 PM3394B
1V / div DC
20 s / div
B29 PM3394B
1V / div DC
20 s / div
FALCONIC
7718
SAA4992
COMPRESS
DECOMPRESS
DEINTERLACER
PIXEL PEAK
VECTORS
MOTION ESTIMATOR
LEFT MPRAM
RIGHT MPRAM
VECTORS
UPCONVERSION
VERTICAL PEAKING
VERTICAL ZOOM
VECTORS
DNR
SNERT INTER
CONTROL
BST
7717
MSM54V12222A
FIELD MEMORY
FM2
7719
MSM54V12222A
FIELD MEMORY
FM3
5716
2784 100n
+3V3_INT
2780 100n
9713
9712 RES
9715
9714 RES
2782 100n
9769
CLK32
CLK32FM2
2785 100n
2786 100n
+3V3FA
+2V5FB
9716
3766 47K
9717
3767 RES 47K
2788 100n
2787 100n
SN-DA
SN-CL
B29
B28
RSTR
3782 47K
3740 1K
TRST
3773 47K
TMS
3781 47K
9720 RES
TDO
TDOA
3783 47K
TCK
3774 47K
2802 100n
2801 100n
2800 100n
2899 100n
+2V5FB +3V3FA
2798 100n
2797 100n
2796 100n
2795 100n
2789 100n
2790 100n
RE_F
CLK32
5719 +3V3_FBX
2794 10u
2793 100n
5718 +2V5B
2792 10u
2791 100n
5717 +3V3_INT
2799 100n
9721 RES
9722
9723 RES
2776 100n
9724
2819 100n
CLK32
9768
CLK32FM3
FROM B3a
CL 26532041_024.eps
170402

	OKI	PHILIPS
4721	X	
4722		X
4723	X	
4724		X
4712	X	
4713		X
4714	X	
4715		X

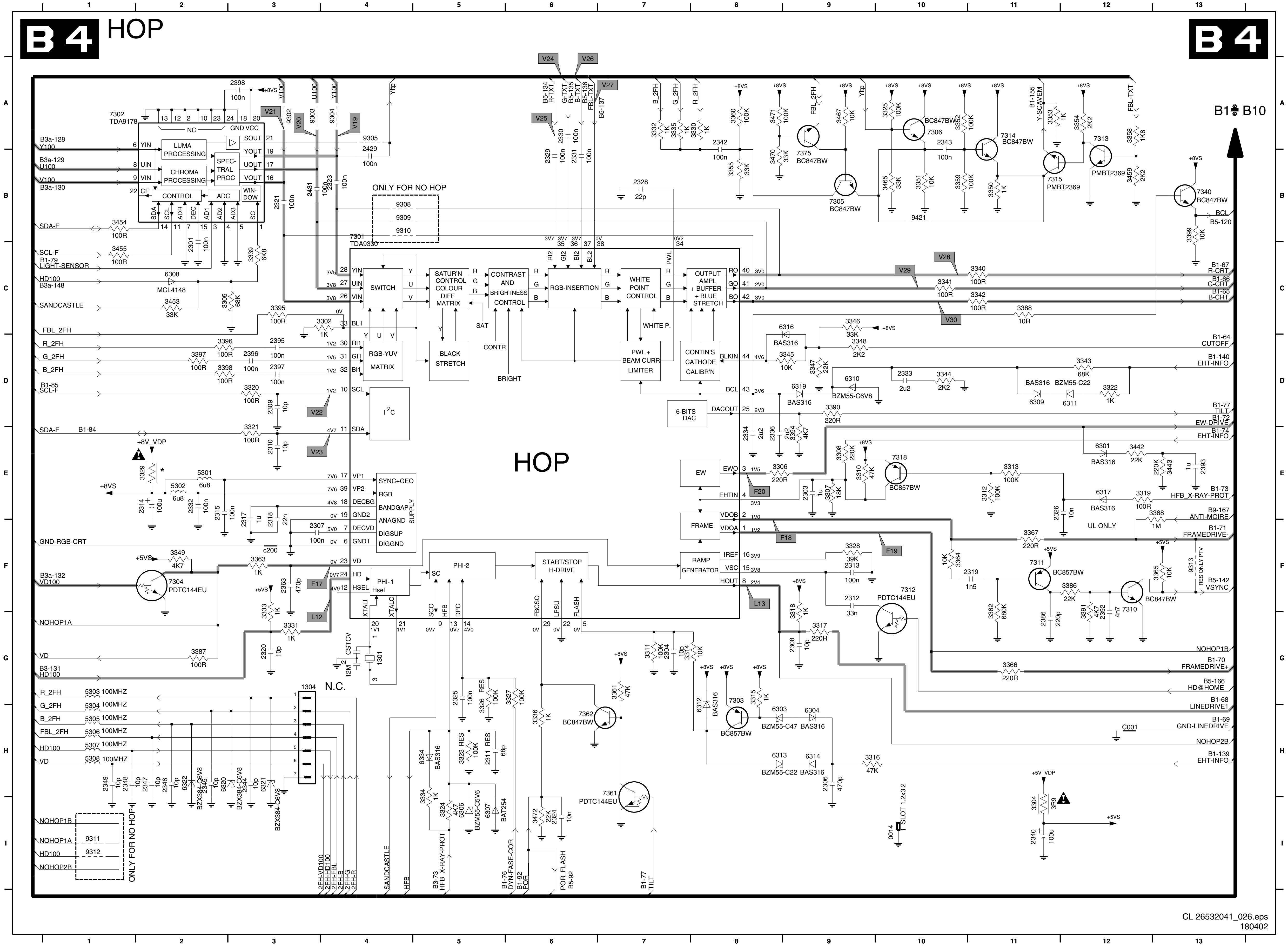
2776	I12
2780	I1
2782	I3
2784	E1
2785	D4
2786	E4
2787	F4
2788	E4
2789	I6
2790	I8
2791	E14
2792	E13
2793	D14
2794	D13
2795	G11
2796	E11
2797	E11
2798	C11
2799	E14
2800	B8
2801	B7
2802	B7
2819	I14
2899	B5
3740	G4
3766	E4
3767	E3
3773	G3
3774	H3
3781	G3
3782	G4
3783	H4
5716	E1
5717	E14
5718	D14
5719	C14
7717	F1
7718	C7
7719	F13
9712	F3
9713	F2
9714	I2
9715	I2
9716	E4
9717	E3
9720	G4
9721	F14
9722	F14
9723	H14
9724	I14
9768	I13
9769	I2

Small Signal Board: Eagle

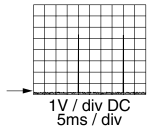

B3C
EAGLE
7722
MS81V04160
FIELD MEMORY
FM4
7723
MS81V04160
FIELD MEMORY
FM5
7724
T8F24EF
EAGLE - IC
7725
PMBT2369
7720
LD1117
7726
LD1117
7727
LF15AB
7728 BFS20
7729 BFS20
7730 BFS20
7731 BFS20
7732 BFS20
7733 BFS20
SEE MAPPING D12
SEE MAPPING A11
UVG(0:7)
YG(0:7)
UVF0(0:7)
YF0(0:7)
+2V5FCA
+2V5FCD
+1V5FCA
+1V5FCC
+3V3FCD
+8V_CON
Y_EAGLE_E
U_EAGLE_E
V_EAGLE_E
B3a-171
B3a-172
B3a-173
L24
L25
L26
1 V / div DC
10µs / div
B1 ÷ B10
CL 26532041_025.eps
220402

2709	C6
2710	D6
2711	E7
2712	A8
2716	D7
2717	J7
2725	J7
2726	J7
2727	J9
2731	A10
2732	B12
2733	C12
2734	D13
2735	G11
2736	J9
2737	J12
2738	J12
2739	J12
2747	A9
2754	A12
2768	A9
2770	F14
2771	F14
2772	F14
2774	C14
2783	I11
2803	B14
2804	B14
2805	G13
2806	B13
2807	B13
2808	B12
2809	E5
2810	B4
2811	E5
2812	F5
2813	B3
2814	I12
2815	J7
2816	J10
2817	C1
2818	J12
2820	E2
2821	E3
2822	E3
2825	D4
2826	F5
2827	I6
2828	I9
2829	F3
2830	I10
2832	G4
2833	H5
2835	I4
2838	J3
2839	J6
2840	J9
2841	J11
2843	H1
2845	C5
2846	C5
2847	A12
2848	B7
2851	A11
2853	F13
2854	E13
2855	G7
2857	F12
2859	G10
2860	G11
2861	B7
2864	D13
2865	E13
2866	G10
2867	E6
2875	H12
2876	H13
2880	H13
2884	D14
2885	J10
2886	G7
2887	G7
2888	G7
2889	G8
2890	G9
2891	G9
2892	G7
2893	H8
2894	H9
2895	H10
2896	H8
2897	H9
2898	H7
3711	F7
3744	A5
3745	B6
3757	B8
3771	F6
3772	G6
3785	I6
3786	I8
3787	I11
3788	I6
3789	I9
3790	I11
3791	J7
3792	C12
3793	A6
3794	A9
3795	F6
3800	G7
3801	H1
3802	G7
3803	H7
3804	C13
3805	J10
3806	J12
3807	J6
3808	J9
3809	J11
3810	J6
3811	J8
3812	J8
3813	J9
3814	J10
3815	J10
3816	J11
3817	J13
3818	J13
3819	G12
3820	G12
3821	H7
3822	H7
3823	H7
3824	H7
3825	G7
3826	G7
3827	H7
5705	H12
5721	A12
5722	B14
5723	A12
5724	F13
5725	B14
5726	F5
5727	E5
5728	D14
5738	G12
5739	J7
5740	J9
5741	J12
5742	F13
5743	C14
5745	G14
7720	A13
7722	C3
7723	H3
7724	D1
7725	B6
7726	G13
7727	E14
7728	I6
7729	I9
7730	I11
7731	J6
7732	J8
7733	J11
9718	A13
9719	A13
9740	F6
9741-A	G
9741-B	G
9741-C	G
9741-D	F
9744	C13
9745	C13
9746	C13
9747	C13
9750	F6
9753	E7
9754	B8
9762	B3
9763	E3
9764	G3
9765	I3
9766	H1

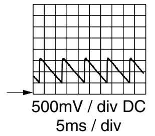
Small Signal Board:


B4
HOP
B4
B1 ÷ B10
7302 TDA9178
LUMA PROCESSING
CHROMA PROCESSING
SPEC-TRAL PROC
CONTROL
ADC
WIN-DOW
ONLY FOR NO HOP
7301 TDA9330
SWITCH
SATUR'N CONTROL COLOUR DIFF MATRIX
CONTRAST AND BRIGHTNESS CONTROL
RGB-INSERTION
WHITE POINT CONTROL
OUTPUT AMPL + BUFFER + BLUE STRETCH
RGB-YUV MATRIX
BLACK STRETCH
PWL + BEAM CURR LIMITER
CONTIN'S CATHODE CALIBR'N
I²C
6-BITS DAC
HOP
EW
FRAME
RAMP GENERATOR
SYNC+GEO RGB BANDGAP ANAGND DIGSUP DIGGND SUPPLY
PHI-1 Hsel
PHI-2
START/STOP H-DRIVE
1304
N.C.
ONLY FOR NO HOP
UL ONLY
RES ONLY PTV
SLOT 1.2x3.2
CL 26532041_026.eps
180402

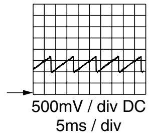
F17



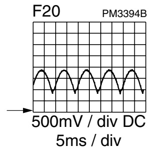
F18



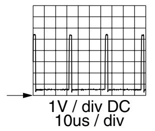
F19



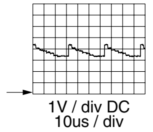
F20



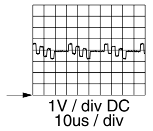
L12



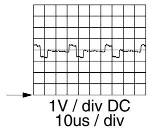
V19



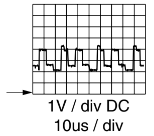
V20



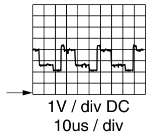
V21



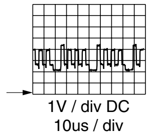
V28



V29

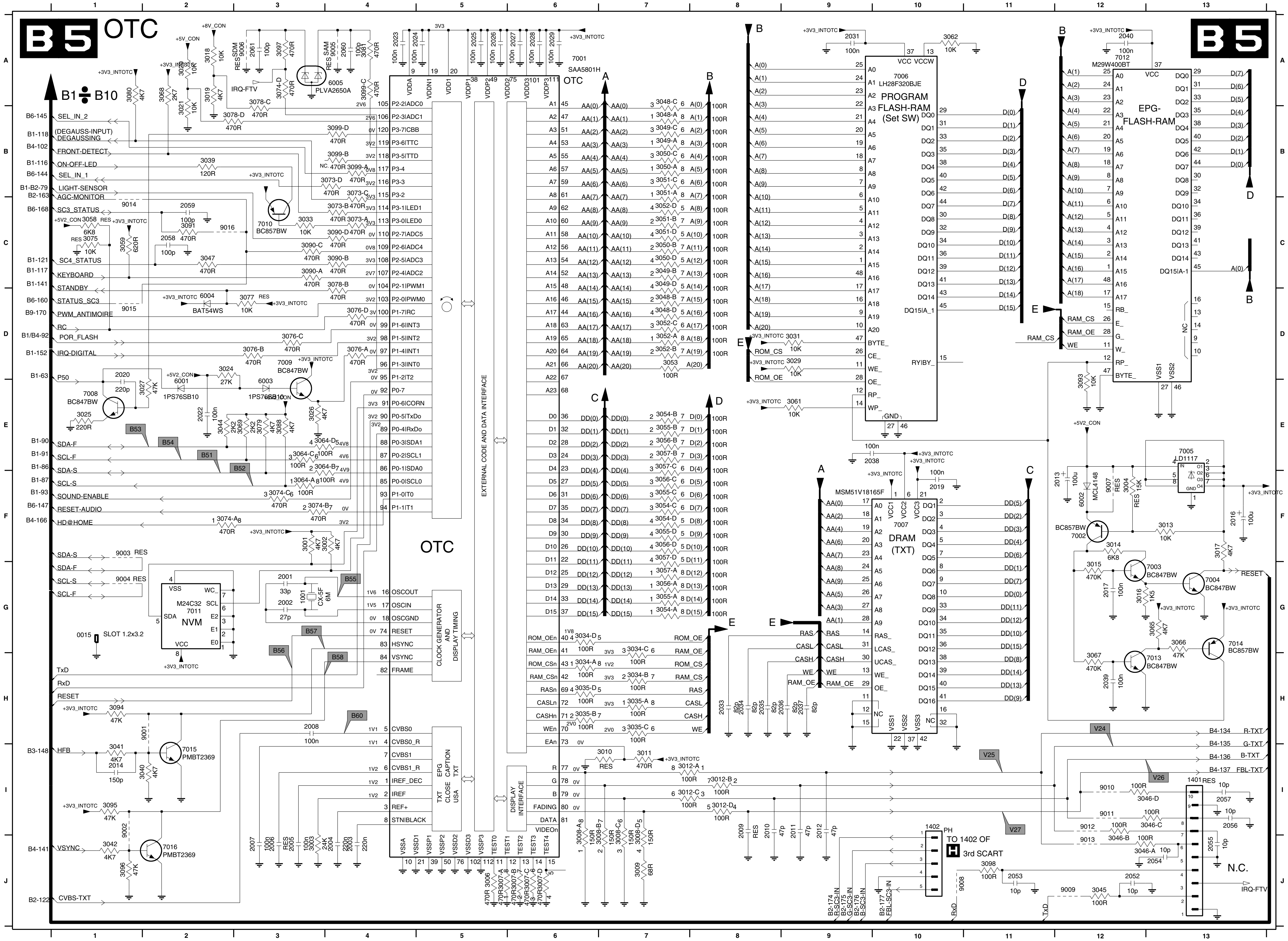


V30



0014	I10
1301	G4
1304	G3
2301	C2
2303	E9
2304	G7
2306	H9
2307	F3
2308	G9
2309	D3
2310	E3
2311	H5
2312	F9
2313	F9
2314	E2
2315	E2
2317	F3
2318	F3
2319	F11
2320	G3
2321	B3
2323	B4
2324	I6
2325	G5
2326	E11
2328	B7
2329	B6
2330	A6
2331	B6
2332	E2
2333	D10
2334	E8
2336	E8
2340	I11
2342	A8
2343	A10
2344	H3
2345	H2
2346	H2
2347	H2
2348	H1
2349	H1
2363	F3
2386	G11
2392	G12
2393	E13
2395	D3
2396	D3
2397	D3
2398	A3
2429	B4
2431	B3
3302	C4
3304	I11
3305	C2
3306	E8
3307	E9
3308	E9
3310	E9
3311	G7
3312	E11
3313	E11
3314	G7
3315	G8
3316	H9
3317	G9
3318	F9
3319	E12
3320	D3
3321	E3
3322	D12
3323	H5
3324	I5
3325	A10
3326	H5
3327	G6
3328	F9
3329	E2
3330	A8
3331	G3
3332	A7
3333	F3
3334	H5
3335	A7
3336	H6
3339	C3
3340	C11
3341	C10
3342	C11
3343	D12
3344	D10
3345	D9
3346	C9
3347	D9
3348	D9
3349	F2
3350	B11
3351	B10
3352	A10
3353	A11
3354	A12
3355	B8
3358	A12
3359	B10
3360	A8
3361	G7
3362	F11
3363	F3
3364	F10
3365	F13
3366	G11
3367	F11
3368	E13
3386	F12
3387	G2
3388	C11
3390	D9
3391	F12
3394	E9
3395	C3
3396	D2
3397	D2
3398	D2
3399	B13
3442	E12
3443	E13
3453	C2
3454	B1
3455	C1
3459	B12
3465	B10
3467	A9
3470	B8
3471	A8
3472	I6
5301	E2
5302	E2
5303	G1
5304	H1
5305	H1
5306	H1
5307	H1
5308	H1
6301	E12
6303	H8
6304	H9
6306	I5
6307	I5
6308	C2
6309	D11
6310	D9
6311	D12
6312	H8
6313	H8
6314	H9
6316	C9
6317	E12
6319	D9
6320	H2
6321	H3
6322	H2
6334	H5
7301	B4
7302	A1
7303	G8
7304	F2
7305	B9
7306	A10
7310	F12
7311	F11
7312	F10
7313	A12
7314	A11
7315	B12
7318	E10
7340	B13
7361	H7
7362	H6
7375	B9
9302	A3
9303	A3
9304	A4
9305	A4
9308	B4
9309	B4
9310	B4
9311	I1
9312	I1
9313	F13
9421	B10
C001	H12
c200	F3

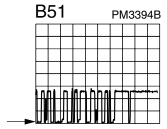
Small Signal Board: OTC


B5
OTC
B1 ÷ B10
7001
SAA5801H
OTC
EXTERNAL CODE AND DATA INTERFACE
CLOCK GENERATOR AND DISPLAY TIMING
TXT CLOSE CAPTION EPG USA
DISPLAY INTERFACE
7006
LH28F320BJE
PROGRAM FLASH-RAM
(Set SW)
7012
M29W400BT
EPG-FLASH-RAM
7007
MSM51V18165F
DRAM
(TXT)
7011
M24C32
NVM
7005
LD1117
6005
PLVA2650A
7010
BC857BW
7008
BC847BW
7009
BC847BW
7015
PMBT2369
7016
PMBT2369
7002
BC857BW
7003
BC847BW
7004
BC847BW
7013
BC847BW
7014
BC857BW
6004
BAT54WS
6001
1PS76SB10
6003
1PS76SB10
6002
MCL4148
0015
SLOT 1.2x3.2
1001
CX-5F
6M
B6-145 SEL_IN_2
B1-118 (DEGAUSS-INPUT) DEGAUSSING
B4-102 FRONT-DETECT
B1-116 ON-OFF-LED
B6-144 SEL_IN_1
B1-B2-79 LIGHT-SENSOR
B2-163 AGC-MONITOR
B6-168 SC3_STATUS
B1-121 SC4_STATUS
B1-117 KEYBOARD
B1-141 STANDBY
B6-160 STATUS_SC3
B9-170 PWM_ANTIMOIRE
RC
B1/B4-92 POR_FLASH
B1-152 IRQ-DIGITAL
B1-63 P50
B1-90 SDA-F
B1-91 SCL-F
B1-86 SDA-S
B1-87 SCL-S
B1-93 SOUND-ENABLE
B6-147 RESET-AUDIO
B4-166 HD@HOME
TxD
RxD
RESET
B3-148 HFB
B4-141 VSYNC
B2-122 CVBS-TXT
B4-134 R-TXT
B4-135 G-TXT
B4-136 B-TXT
B4-137 FBL-TXT
IRQ-FTV
1402 PH
TO 1402 OF
H 3rd SCART
1401 RES
N.C.
B51
B52
B53
B54
B55
B56
B57
B58
B60
V24
V25
V26
V27
+3V3_INTOTC
+5V2_CON
+8V_CON
+5V_CON
A
B
C
D
E

CL 26532041_027.eps
220402

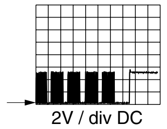
0015	G1
1001	G3
1401	I13
1402	I10
2001	G3
2002	G3
2003	J4
2004	J4
2005	J3
2006	J3
2007	J3
2008	H3
2009	I8
2010	I8
2011	I9
2012	I9
2013	F12
2014	I1
2016	F13
2017	G12
2019	F10
2020	D1
2022	E2
2023	A4
2024	A5
2025	A5
2026	A5
2027	A6
2028	A6
2029	A6
2031	A9
2033	H8
2034	H8
2035	H8
2036	H9
2037	H9
2038	E9
2039	H12
2040	A12
2052	J12
2053	J11
2054	J13
2055	J13
2056	I13
2057	I13
2058	C2
2059	C2
2060	A4
2061	A3
3001	F3
3002	F4
3003	J3
3004	F12
3006	J5
3007-A	J5
3007-B	J6
3007-C	J6
3007-D	J6
3008-A	I6
3008-B	I7
3008-C	I7
3008-D	I7
3009	J7
3010	I7
3011	I7
3012-A	I7
3012-B	I8
3012-C	I7
3012-D	I8
3013	F13
3014	F12
3015	G12
3016	G12
3017	F13
3018	A2
3019	A2
3020	A2
3021	B2
3024	D2
3025	E1
3026	E3
3027	E2
3029	D9
3031	D9
3033	C3
3034-A	H6
3034-B	H7
3034-C	G7
3034-D	G6
3035-A	H7
3035-B	H6
3035-C	H7
3035-D	H6
3039	B2
3040	I2
3041	I1
3042	J1
3044	E2
3045	J12
3046-A	J12
3046-B	J12
3046-C	I13
3046-D	I13
3047	C2
3048-A	B7
3048-B	D7
3048-C	A7
3048-D	D7
3049-A	B7
3049-B	C7
3049-C	B7
3049-D	C7
3050-A	B7
3050-B	C7
3050-C	B7
3050-D	C7
3051-A	B7
3051-B	C7
3051-C	B7
3051-D	C7
3052-A	D7
3052-B	D7
3052-C	D7
3052-D	C7
3053	D7
3054-A	G7
3054-B	E7
3054-C	F7
3054-D	F7
3055-A	G7
3055-B	E7
3055-C	F7
3055-D	F7
3056-A	G7
3056-B	E7
3056-C	F7
3056-D	F7
3057-A	G7
3057-B	E7
3057-C	E7
3057-D	F7
3058	C1
3059	C1
3061	E9
3062	A10
3064-A	F3
3064-B	E4
3064-C	E3
3064-D	E4
3065	G13
3066	G13
3067	H12
3068	A2
3069	E3
3073-A	C4
3073-B	C4
3073-C	B4
3073-D	B4
3074-A	F2
3074-B	F3
3074-C	F3
3074-D	A3
3075	C1
3076-A	D4
3076-B	D3
3076-C	D3
3076-D	D4
3077	D3
3078-B	C4
3078-C	A3
3078-D	B3
3079	E3
3080	A1
3081	A4
3088	E3
3090-A	C3
3090-B	C4
3090-C	C3
3090-D	C4
3091	C2
3093	E12
3094	H1
3095	I1
3096	J1
3097	A3
3098	J11
3099-A	B4
3099-B	B4
3099-C	A4
3099-D	B4
6001	E2
6002	F12
6003	E3
6004	D2
6005	A4
7001	A6
7002	F12
7003	G13
7004	G13
7005	E13
7006	A10
7007	F10
7008	E1
7009	D3
7010	C3
7011	G2
7012	A12
7013	H13
7014	G13
7015	I2
7016	J2
9001	H2
9002	I1
9003	F1
9004	G1
9005	A4
9006	A3
9007	F12
9008	J10
9009	J12
9010	I12
9011	I12
9012	I12
9013	J12
9014	C1
9015	D1
9016	C2

B51 PM3394B



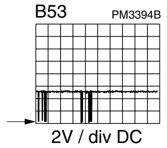
2V / div DC
100us / div

B52 PM3394B



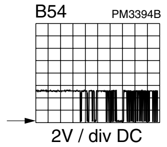
2V / div DC
100us / div

B53 PM3394B



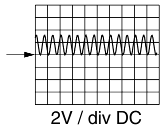
2V / div DC
5ms / div

B54 PM3394B



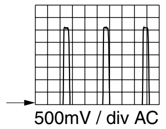
2V / div DC
5ms / div

B55 PM3394B



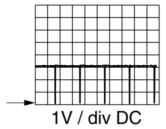
2V / div DC
250ns / div

B57 PM3394B



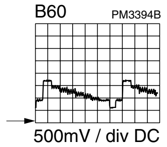
500mV / div AC
10us / div

B58 PM3394B



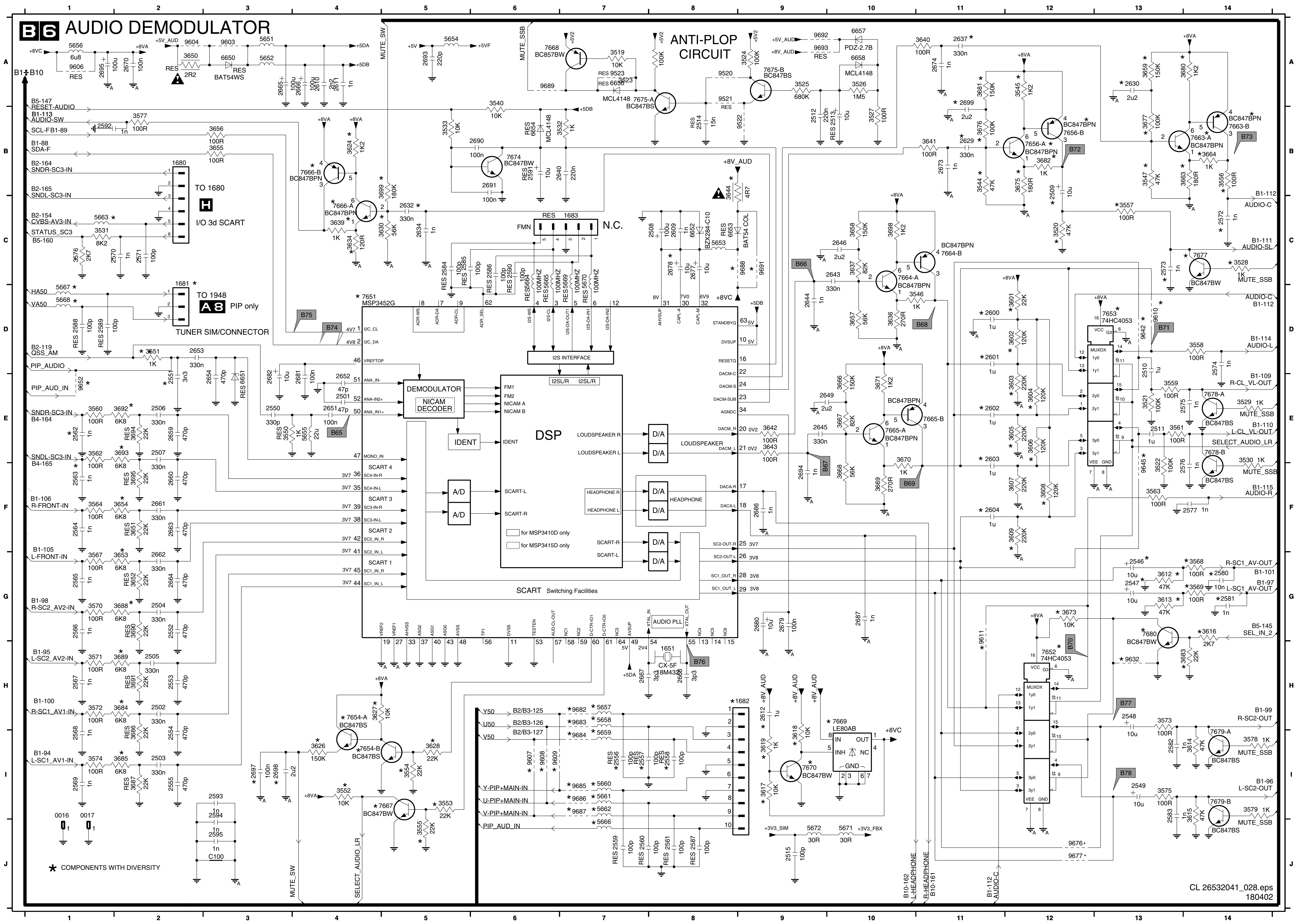
1V / div DC
5ms / div

B60 PM3394B

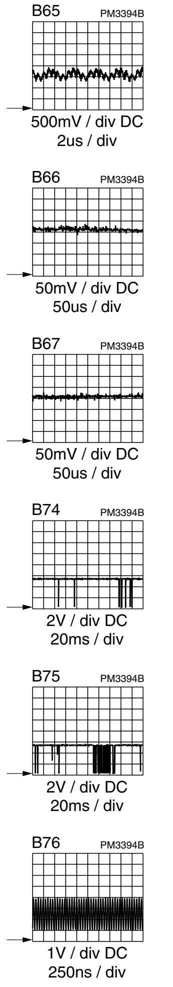


500mV / div DC
10us / div

Small Signal Board: Audio Demodulator

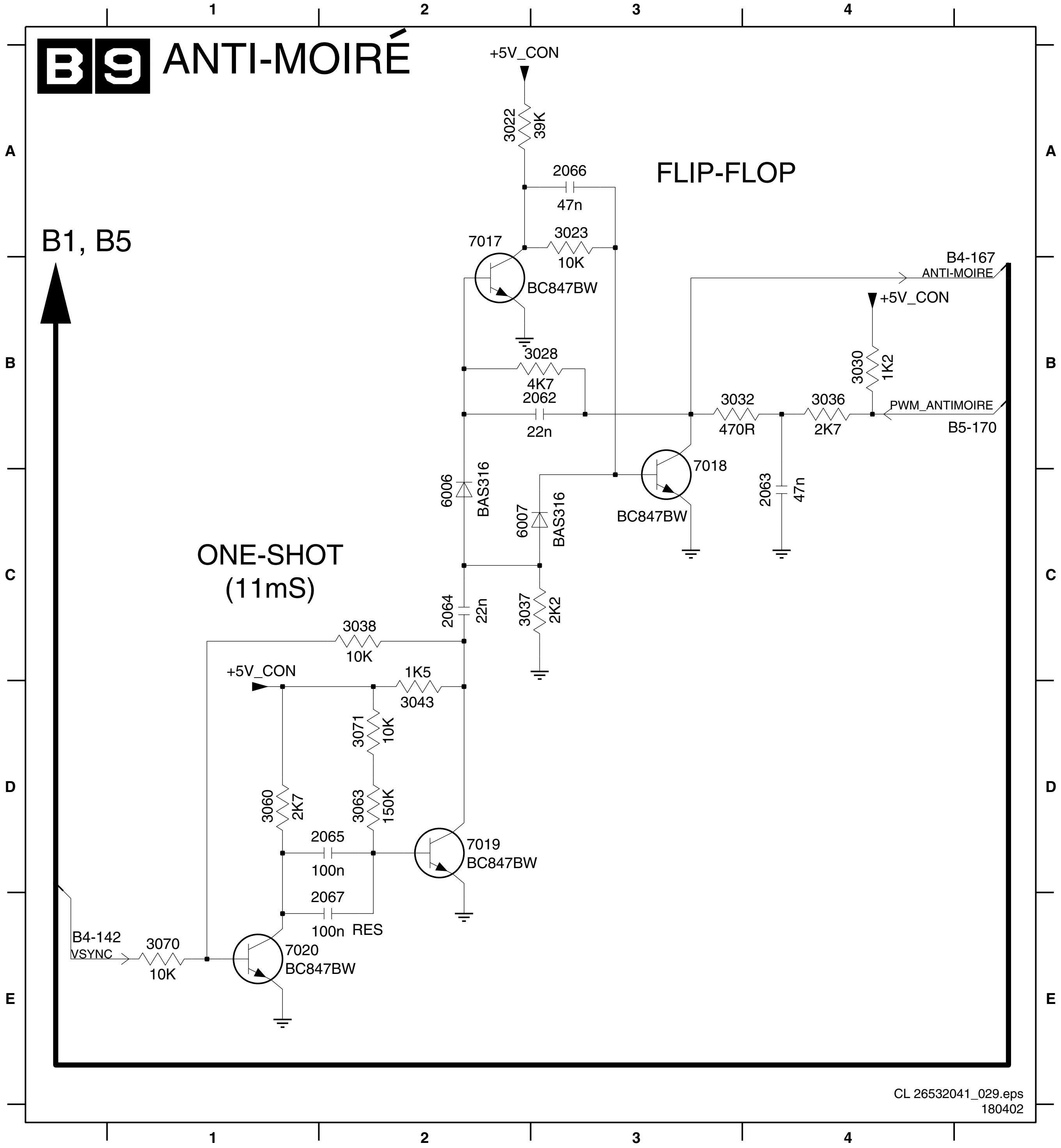

B6 AUDIO DEMODULATOR
ANTI-PLOP CIRCUIT
7651 MSP3452G
DEMODULATOR
NICAM DECODER
DSP
IDENT
I2S INTERFACE
A/D
D/A
LOUDSPEAKER
HEADPHONE
SCART Switching Facilities
AUDIO PLL
TO 1680
H
I/O 3d SCART
TO 1948
A8
PIP only
TUNER SIM/CONNECTOR
FMN
N.C.
for MSP3410D only
for MSP3415D only
74HC4053
LE80AB
MUTE_SW
SELECT_AUDIO_LR
★ COMPONENTS WITH DIVERSITY
CL 26532041_028.eps
180402

0016 I1
0017 I1
1651 H8
1680 B2
1681 D2
1682 H8
1683 C6
2501 E4
2502 H2
2503 I2
2504 G2
2505 H2
2506 E2
2507 E2
2508 C8
2509 B12
2510 D13
2511 E13
2512 B9
2513 B10
2514 B8
2515 J9
2546 G13
2547 G13
2548 H13
2549 I13
2550 E3
2551 E2
2552 G2
2553 H2
2554 I2
2555 I2
2556 I7
2557 I7
2558 I8
2559 J7
2560 J7
2561 J8
2562 E1
2563 F1
2564 F1
2565 G1
2566 G1
2567 H1
2568 I1
2569 I1
2570 C2
2571 C2
2572 C14
2573 C13
2574 D14
2575 E14
2576 F14
2577 F14
2580 G14
2581 G14
2582 I13
2583 I13
2584 C5
2585 C5
2586 C6
2587 J8
2588 D1
2589 D1
2590 C6
2591 B6
2592 B1
2593 I3
2594 I3
2595 J3
2600 D11
2601 D11
2602 E11
2603 E11
2604 F11
2609 C8
2610 A4
2611 A4
2612 H9
2629 B11
2630 A13
2632 C5
2634 C5
2637 A11
2640 B7
2643 C10
2644 D9
2645 E9
2646 C10
2649 E9
2651 E4
2652 E4
2653 D2
2654 E3
2659 E2
2660 F2
2661 F2
2662 G2
2663 F2
2664 G2
2665 A3
2666 A4
2667 H7
2668 H8
2670 A2
2673 B11
2674 A11
2677 C8
2678 C8
2679 G9
2680 G9
2681 E4
2682 E3
2686 F9
2687 G10
2690 B6
2691 B6
2693 A5
2694 F9
2695 A1
2697 I3
2698 I3
2699 A11
3519 A7
3520 C12
3521 E13
3522 F13
3523 A7
3524 A9
3525 A9
3526 A10
3527 B10
3528 C14
3529 E14
3530 E14
3531 C1
3532 B7
3533 B5
3540 A6
3544 B11
3545 A12
3546 D11
3547 B13
3550 E3
3551 D2
3552 I4
3553 I5
3554 I5
3555 J5
3556 B14
3557 C13
3558 D14
3559 E13
3560 E1
3561 E13
3562 E1
3563 F13
3564 F1
3567 G1
3568 G14
3569 G14
3570 G1
3571 H1
3572 H1
3573 H13
3574 I1
3575 I13
3576 C1
3577 B2
3578 I14
3579 I14
3601 D12
3602 D12
3603 E12
3604 E12
3605 E12
3606 E12
3607 F12
3608 F12
3609 F12
3612 G13
3613 G13
3614 I14
3615 I14
3616 G14
3617 I9
3618 I9
3619 I9
3624 B4
3626 I4
3627 H4
3628 I5
3630 C5
3634 C4
3636 D10
3637 C10
3639 C4
3640 A11
3641 B11
3642 E9
3643 E9
3644 B8
3650 A2
3651 F2
3652 G2
3653 G2
3654 F2
3655 B3
3656 B3
3657 D10
3658 C10
3659 A13
3663 B14
3664 B14
3666 E10
3667 E10
3668 F10
3669 F10
3670 E10
3671 E10
3673 G12
3675 B12
3676 B11
3677 B13
3680 A14
3681 A11
3682 B12
3683 H14
3684 H2
3685 I2
3686 I2
3687 I2
3688 G2
3689 H2
3690 G2
3691 H2
3692 E2
3693 E2
3694 E2
3695 F2
3698 C10
3699 B5
5651 A3
5652 A3
5653 C8
5654 A5
5655 E4
5656 A1
5657 H7
5658 H7
5659 I7
5660 I7
5661 I7
5662 I7
5663 C1
5664 C6
5665 C6
5666 J7
5667 D1
5668 D1
5669 C7
5670 C7
5671 J10
5672 J9
6650 A3
6651 E3
6652 C8
6653 C8
6654 B6
6656 A7
6657 A10
6658 A10
7651 D4
7652 H12
7653 D13
7654-A H4
7654-B I4
7656-A B12
7656-B B12
7663-A B14
7663-B B14
7664-A C10
7664-B C11
7665-A E10
7665-B E11
7666-A C4
7666-B B4
7667 I5
7668 A6
7669 H10
7670 I9
7674 B6
7675-A A8
7675-B A9
7677 C14
7678-A E14
7678-B E14
7679-A I14
7678-B E14
7679-A I14
7679-B I14
7680 G13
9520 A8
9521 A8
9522 B9
9523 A7
9603 A3
9604 A2
9606 A1
9607 I6
9608 I6
9609 I6
9610 D13
9611 G11
9632 H13
9642 D13
9645 F13
9652 E1
9676 J12
9677 J12
9682 H7
9683 H7
9684 I7
9685 I7
9686 I7
9687 I7
9688 C9
9689 A6
9691 C9
9692 A9
9693 A9
C100 J3



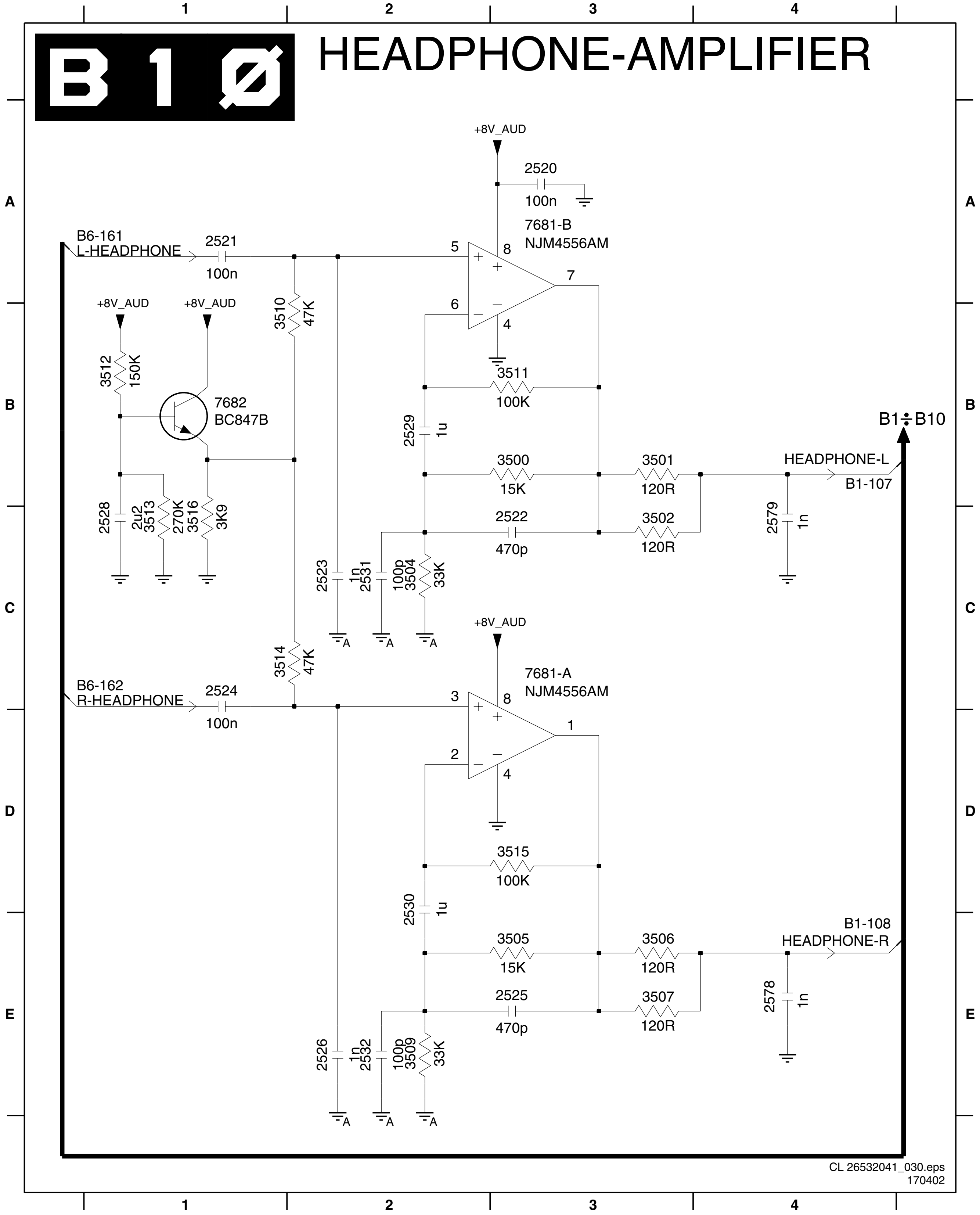
Small Signal Board: Anti-moiré

2062 B3	2065 D2	3022 A2	3030 B4	3037 C2	3060 D1	3071 D2	7017 A2	7020 E1
2063 C4	2066 A3	3023 A3	3032 B3	3038 C2	3063 D2	6006 C2	7018 C3	
2064 C2	2067 E2	3028 B3	3036 B4	3043 D2	3070 E1	6007 C2	7019 D2	


B9 ANTI-MOIRÉ
1
2
3
4
A
B
C
D
E
+5V_CON
3022 39K
2066 47n
FLIP-FLOP
7017
3023 10K
BC847BW
B1, B5
B4-167
ANTI-MOIRE
+5V_CON
3028 4K7
3030 1K2
2062 22n
3032 470R
3036 2K7
PWM_ANTIMOIRE
B5-170
7018
BC847BW
6006 BAS316
6007 BAS316
2063 47n
ONE-SHOT (11mS)
2064 22n
3037 2K2
3038 10K
+5V_CON
1K5 3043
3071 10K
3060 2K7
3063 150K
2065 100n
7019 BC847BW
2067 100n RES
B4-142 VSYNC
3070 10K
7020 BC847BW
CL 26532041_029.eps
180402

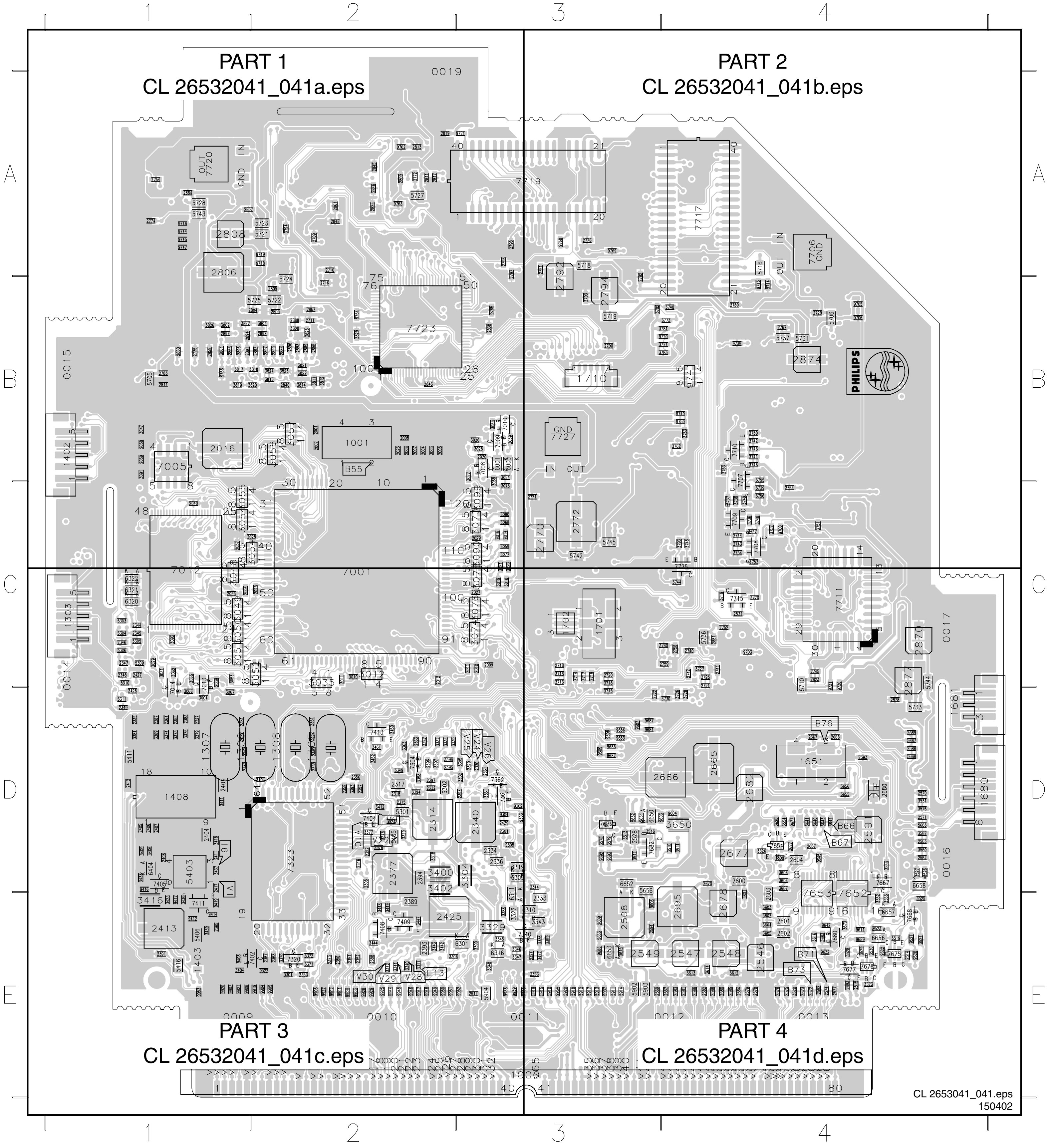
Small Signal Board:

2520 A3	2525 E3	2531 C2	3501 B3	3507 E3	3513 C1	7681-B A3
2521 A1	2526 E2	2532 E2	3502 C3	3509 E2	3514 C1	7682 B1
2522 C3	2528 C1	2578 E4	3504 C2	3510 B1	3515 D3	
2523 C2	2529 B2	2579 C4	3505 E3	3511 B3	3516 C1	
2524 C1	2530 D2	3500 B3	3506 E3	3512 B1	7681-A C3	


B10 HEADPHONE-AMPLIFIER
1
2
3
4
A
B
C
D
E
+8V_AUD
2520 100n
7681-B NJM4556AM
B6-161 L-HEADPHONE
2521 100n
+8V_AUD
+8V_AUD
3510 47K
3512 150K
7682 BC847B
3511 100K
2529 1u
B1÷B10
3500 15K
3501 120R
HEADPHONE-L
B1-107
2522 470p
3502 120R
2579 1n
2528 2u2
3513 270K
3516 3K9
2523 1n
2531 100p
3504 33K
+8V_AUD
3514 47K
7681-A NJM4556AM
B6-162 R-HEADPHONE
2524 100n
3515 100K
2530 1u
3505 15K
3506 120R
B1-108 HEADPHONE-R
2525 470p
3507 120R
2578 1n
2526 1n
2532 100p
3509 33K
CL 26532041_030.eps
170402

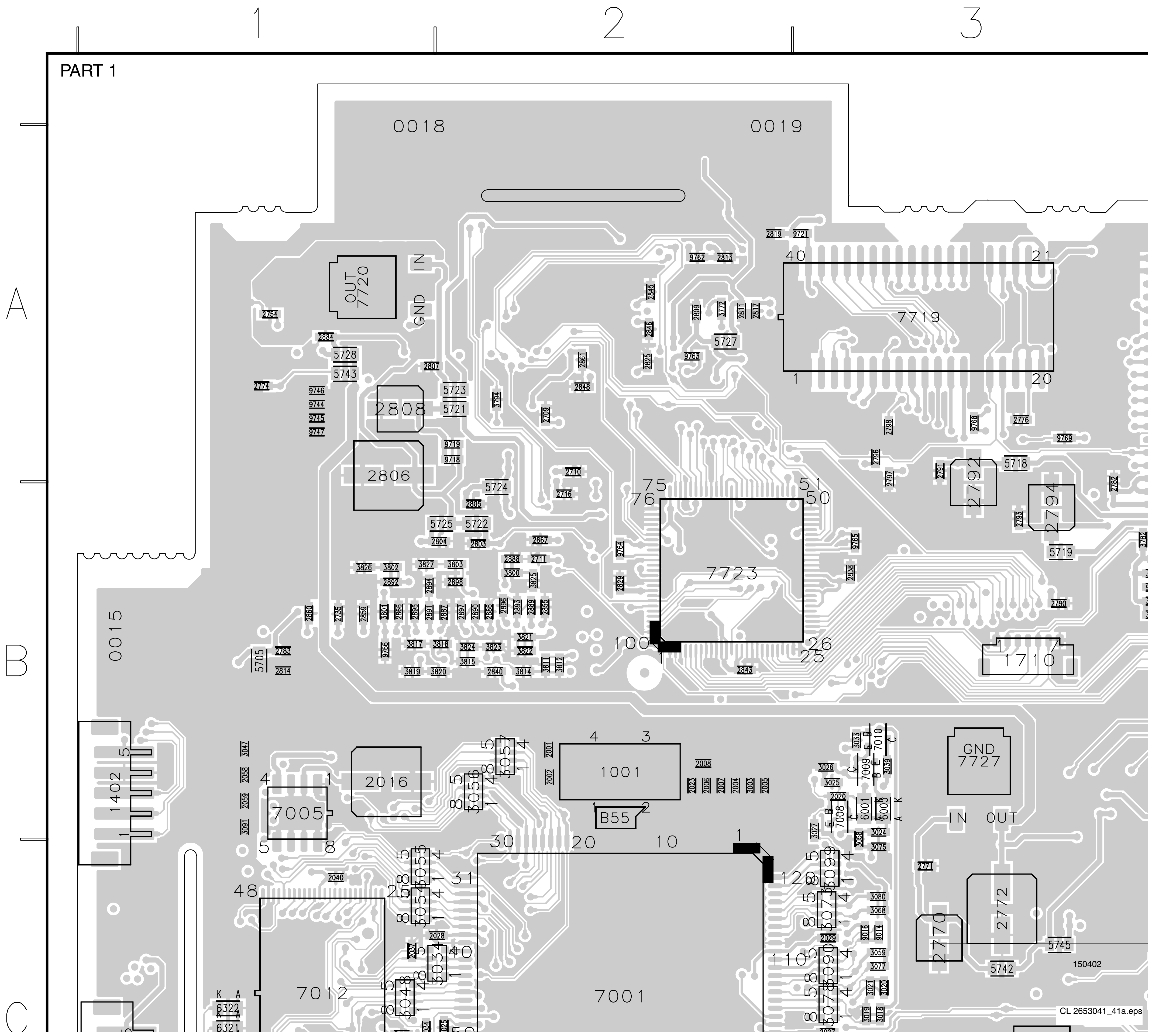
Layout Small Signal Board (Overview Top Side)

0009	E1	0017	C4	1408	D1	2002	B2	2011	C3	2029	C3	2301	D3	2324	E3	2336	D3	2349	D1
0010	E2	0018	A1	1651	D4	2004	B2	2012	C2	2034	C1	2305	D2	2327	D1	2339	D1	2350	E2
0011	E3	0019	A2	1680	D4	2005	B2	2016	B1	2035	C1	2314	D2	2329	D3	2340	D3	2351	E2
0012	E4	1000	E3	1681	D4	2006	B2	2020	B3	2037	C1	2315	D2	2330	D3	2344	C1	2352	E2
0013	E4	1001	B2	1701	C3	2007	B2	2023	B2	2039	C1	2316	D2	2331	D3	2345	C1	2353	E2
0014	D1	1303	C1	1702	C3	2008	B2	2025	C2	2040	C1	2317	D2	2332	D2	2346	C1	2355	D1
0015	B1	1402	B1	1710	B3	2009	C3	2027	C3	2058	B1	2318	D2	2333	E3	2347	C1	2356	D2
0016	D4	1403	E1	2001	B2	2010	C3	2028	C2	2059	B1	2322	D2	2334	D3	2348	C1	2357	D2

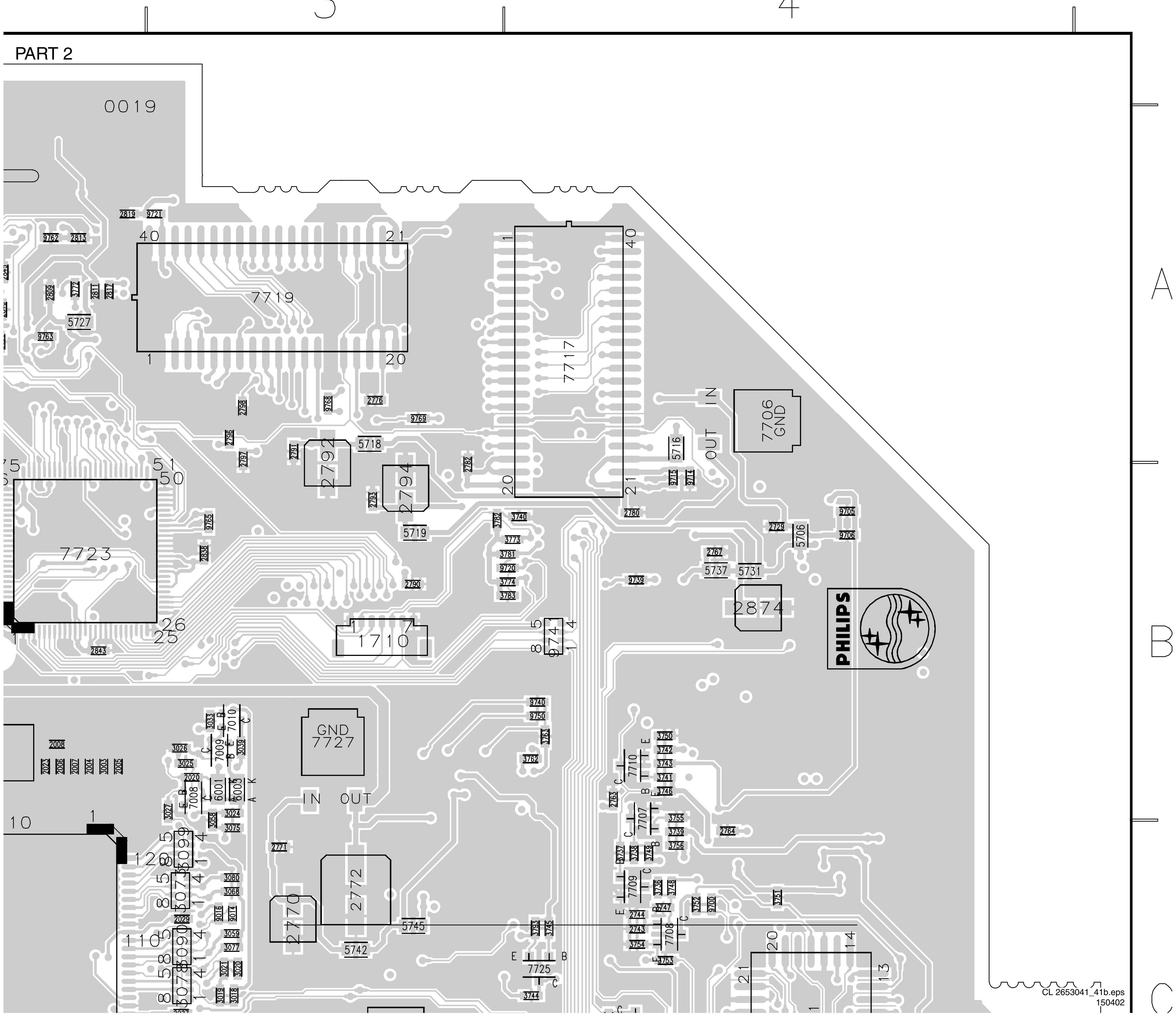


2358	D2	2665	D4	2884	A1	3348	E3	3613	E4	5306	C1	7408	E2	9750	B4
2359	D2	2666	D3	2886	B2	3349	D2	3614	E4	5309	C1	7409	E2	9762	A2
2360	D2	2667	D4	2887	B2	3353	E3	3615	E3	5310	C1	7411	E1	9763	A2
2361	D2	2668	D4	2888	B2	3361	D3	3616	E4	5311	D1	7413	D2	9764	B2
2362	D2	2670	D4	2889	B2	3363	D2	3626	D4	5403	D1	7652	D4	9765	B3
2363	D2	2677	D4	2890	B2	3370	E2	3627	D4	5405	D2	7653	D4	9766	B1
2364	D1	2678	E4	2891	B1	3371	E2	3628	D4	5406	E1	7654	D4	9768	A3
2365	E1	2680	D4	2892	B1	3372	E2	3640	D4	5411	D1	7667	D4	9769	A3
2367	E2	2682	D4	2893	B2	3373	D1	3641	D4	5416	E1	7668	E4	9901	E2
2368	E2	2687	D4	2894	B1	3374	D1	3642	D4	5651	D3	7675	E4	9902	E2
2373	E2	2693	E4	2895	B1	3375	D1	3643	D4	5652	D3	7677	E4	9903	E2
2376	D2	2695	D4	2896	B2	3376	D2	3650	D4	5653	E3	7678	E4	9904	E2
2377	D2	2709	A2	2897	B2	3377	D2	3655	D4	5656	D3	7679	D3	9905	E2
2379	D1	2710	A2	2898	B2	3379	D1	3656	D4	5663	D4	7680	E4	9906	E2
2380	D1	2711	B2	2912	E3	3381	D1	3673	E4	5667	D4	7682	D4	9907	E1
2381	D1	2716	B2	3003	B2	3387	D2	3683	E4	5668	D4	7706	A4	9908	E1
2382	D1	2718	C3	3004	D1	3388	E3	3713	C3	5705	B1	7707	C4	9909	E2
2383	D1	2719	C3	3010	C2	3389	D1	3714	C3	5706	B4	7708	C4	9919	E2
2387	D1	2720	C3	3011	C2	3390	E3	3715	D3	5710	C4	7709	C4	9920	E1
2388	E2	2721	C4	3012	C2	3393	D2	3716	C3	5716	A4	7710	B4	9921	E1
2389	E2	2722	D3	3018	C3	3394	D2	3717	C3	5718	A3	7711	C4	9925	E2
2391	E1	2729	B4	3019	C3	3395	D3	3718	C3	5719	B3	7715	C4	9927	E2
2393	E2	2735	B1	3020	C3	3396	D2	3719	C4	5721	A2	7717	A4	9928	E2
2394	D2	2740	C4	3021	C3	3397	D2	3720	C4	5722	B2	7719	A3	9929	E2
2395	D2	2741	C4	3024	B3	3398	D2	3725	C4	5723	A2	7720	A1	9935	E3
2396	D2	2742	C4	3025	B3	3399	E3	3726	D4	5724	B2	7723	A2	9937	E3
2397	D2	2743	C4	3026	B3	3400	E3	3727	C4	5725	B2	7725	C4	9938	E3
2398	D3	2744	C4	3027	B3	3402	D2	3728	D4	5727	A2	7727	B3	9939	E3
2401	D2	2745	C4	3029	C1	3404	E1	3730	D4	5728	A1	9014	C3	9944	E2
2404	D1	2752	C4	3031	C1	3406	D1	3736	C4	5731	B4	9016	C3	9945	E2
2405	D1	2754	A1	3033	B3	3409	D1	3737	C4	5733	D4	9302	D3	9946	E2
2406	D1	2758	C4	3034	C2	3411	D1	3738	C4	5736	C4	9303	D3	9947	E2
2407	D1	2759	C4	3035	C2	3412	D2	3739	C4	5737	B4	9304	D3	9948	E2
2408	D1	2763	B4	3039	B3	3416	E1	3740	B4	5742	C3	9305	D3	9949	E2
2409	D1	2764	C4	3047	B1	3418	D1	3741	B4	5743	A1	9322	E2	9950	E2
2411	D1	2767	B4	3048	C1	3423	E1	3742	B4	5744	C4	9408	E1	9951	E2
2412	D1	2770	C3	3049	C2	3433	D1	3743	B4	5745	C3	9412	E1	9952	E3
2413	E1	2771	C3	3050	C2	3436	E1	3744	C4	5902	E3	9414	E1	9953	E1
2417	D1	2772	C3	3051	C2	3437	D1	3745	C4	5903	E3	9416	D1	9954	E3
2425	E3	2774	A1	3052	C1	3439	E1	3746	B4	5904	E3	9417	E1		
2427	C1	2776	A3	3053	C1	3442	E2	3747	C4	5910	E3	9419	E1		
2428	D1	2780	B4	3054	C1	3443	E2	3748	C4	5911	E3	9520	E4		
2429	D3	2782	B3	3055	C1	3444	E2	3749	C4	5912	E3	9521	E4		
2508	E3	2783	B1	3056	B2	3447	E2	3750	B4	5913	E3	9522	E4		
2514	E4	2790	B3	3057	B2	3448	E2	3751	C4	5914	E3	9523	E4		
2515	E4	2791	A3	3058	B3	3449	E2	3752	C4	5915	E3	9603	D3		
2528	D3	2792	B3	3059	C3	3460	D2	3753	C4	5917	E3	9604	D4		
2546	E4	2793	B3	3062	C1	3461	D2	3754	C4	5918	E3	9606	E3		
2547	E4	2794	B3	3065	C1	3462	D2	3755	B4	5919	E3	9607	D3		
2548	E4	2796	A3	3066	D1	3472	E3	3756	C4	5920	E3	9608	D3		
2549	E3	2797	A3	3067	D1	3510	D4	3760	C4	6001	B3	9609	D3		
2562	D4	2798	A3	3068	C3	3512	D3	3762	B4	6003	B3	9611	E4		
2563	D4	2803	B2	3073	C3	3513	D3	3763	B4	6301	E3	9632	E4		
2564	E4	2804	B2	3074	C3	3514	D4	3772	A2	6309	D3	9642	E4		
2565	E4	2805	B2	3075	C3	3516	D3	3773	B4	6310	E3	9645	D4		
2566	E4	2806	B1	3076	C3	3519	E4	3774	B4	6311	E3	9677	D4		
2567	E4	2807	A1	3077	C3	3520	E4	3781	B4	6316	E3	9682	D3		
2568	E4	2808	A1	3078	C2	3523	E4	3782	B3	6319	D3	9683	D3		
2569	E3	2809	A2	3080	C3	3524	E4	3783	B4	6320	C1	9684	D3		
2570	D4	2811	A2	3090	C3	3525	E4	3793	C4	6321	C1	9685	D3		
2571	D4	2813	A2	3091	B1	3526	D4	3794	A2	6322	C1	9686	D3		
2572	E4	2814	B1	3093	C1	3527	D4	3800	B2	6404	D1	9687	D3		
2573	E4	2817	A2	3099	C3	3528	E4	3801	B1	6650	D4	9688	E3		
2574	E4	2819	A2	3301	E2	3529	E4	3802	B1	6652	D3	9689	E4		
2575	E4	2823	C4	3302	D3	3530	E4	3803	B2	6653	E3	9692	D3		
2576	E4	2825	A2	3304	D3	3531	D4	3811	B2	6656	E4	9693	D3		
2577	E4	2829	B2	3306	E2	3552	E4	3812	B2	6657	E4	9700	C4		
2578	E4	2831	C4	3317	E2	3553	D4	3814	B2	6658	D4	9703	C4		
2579	E4	2838	B3	3318	D2	3554	D4	3815	B2	7001	B2	9705	B4		
2580	E4	2840	B2	3320	D2	3555	E4	3817	B1	7005	B1	9706	B4		
2581	E4	2843	B2	3321	D2	3560	D4	3818	B2	7008	B3	9714	B4		
2582	E4	2845	A2	3322	E3	3562	D4	3819	B1	7009	B3	9715	B4		
2583	E4	2846	A2	3329	E3	3576	D4	3820	B2	7010	B3	9718	A2		
2588	D4	2848	A2	3330	D2	3578	D3	3821	B2	7012	C1	9719	A2		
2589	D4	2855	B2	3332	D2	3579	D3	3822	B2	7013	C1	9720	B4		
2591	D4	2859	B1	3335	D2	3601	E4	3823	B2	7014	D1	9721	A3		
2592	E4	2860	B1	3336	E3	3602	E4	3824	B2	7304	D2	9730	C4		
2593	D4	2861	A2	3340	E2	3603	E4	3825	B2	7320	E2	9731	C4		
2594	E3	2866	B1	3341	E2	3604	E4	3826	B1	7323	D2	9739	B4		
2600	D4	2867	B2	3342	E2	3605	E4	3827	B1	7340	E3	9740	B4		
2601	E4	2870	C4	3343	E3	3606	D4	5301	D2	7361	D3	9741	B4		
2602	E4	2874	B4	3344	D3	3607	D4	5302	D2	7362	D3	9744	A1		
2603	E4	2877	C4	3345	E3	3608	D4	5303	C1	7402	E1	9745	A1		
2604	D4	2878	D4	3346	E3	3609	D4	5304	C1	7404	D2	9746	A1		
2609	E3	2881	C4	3347	E3	3612	E4	5305	C1	7405	D1	9747	A1		

Layout Small Signal Board (Part 1 Top Side)

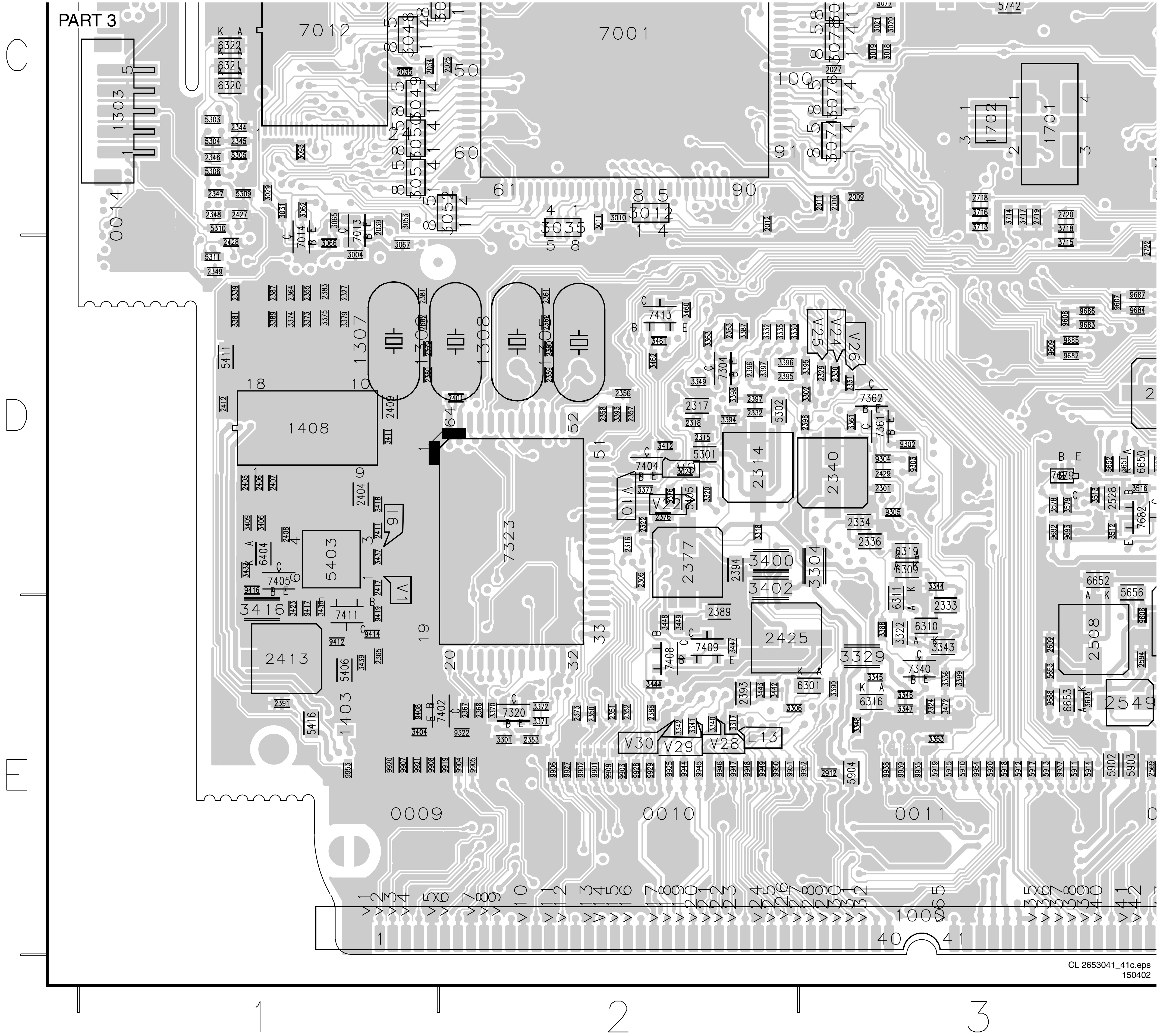

1
2
3
A
B
C
PART 1
0018
0019
0015
OUT
7720
IN
GND
7719
40
21
1
20
2754
2884
5728
5743
2774
9746
9744
9745
9747
2808
2806
2807
5723
5721
9719
9718
5724
2805
5725
5722
2804
2803
2819
9721
9762
2813
2845
2846
2825
2809
3772
2811
2817
5727
9763
2861
2848
2794
2709
2710
2716
2867
2888
2711
3800
3825
3826
3802
2892
3827
3803
2894
2898
2860
2735
2859
3801
2886
2895
2891
2887
2897
2890
2889
2896
2893
2839
2855
3821
3822
9766
3817
3818
3824
3823
3815
3819
3820
2840
3814
3811
3812
5705
2783
2814
9764
2829
75
76
51
50
7723
100
26
25
1
2843
9765
2838
2798
2796
2797
9768
2776
9769
2791
2792
5718
2794
2793
2782
5719
2790
1710
7
1402
5
3047
2058
2059
3091
7005
4
8
2016
3057
3056
2001
2002
1001
4
3
B55
2
2008
2023
2006
2007
2004
2003
2005
30
20
10
120
31
3055
3054
3034
3048
2040
2028
2027
48
7012
7001
110
K
A
6322
6321
3033
7010
3026
7009
3039
3025
2020
7008
6001
6005
3027
3058
3024
3075
3099
3079
3080
3068
3016
3014
2029
3059
3077
3090
3078
3021
3020
3019
3018
GND
7727
IN
OUT
2771
2770
2772
5745
5742
150402
CL 2653041_41a.eps

Layout Small Signal Board (Part 2 Top Side)


3
4
A
B
C
PART 2
0019
7719
7717
7723
7706
GND
IN
OUT
5716
2792
2794
5718
5719
1710
2874
PHILIPS
5737
5731
5706
5727
2819
9721
9762
2813
2809
3772
2811
2817
9763
2798
9768
2776
9769
2796
2797
2791
2782
2793
9765
2838
2790
2843
3782
3740
3773
3781
9720
3774
3783
9741
2780
9715
9714
2729
9705
9706
2767
9739
GND
7727
9740
9750
3763
3762
2008
2023
2006
2007
2004
3003
2005
3026
3025
3033
3039
7009
7010
2020
6001
6003
7008
3027
3058
3024
3075
3099
3073
3090
3078
3080
3068
3016
3014
3059
3077
3021
3020
3019
3018
2029
2771
2770
2772
5745
5742
3753
3745
7725
3744
7710
3750
3742
3743
3741
3746
2763
7707
3755
3739
3756
2764
9737
3738
3749
7709
3736
3748
3752
9700
3751
2744
2743
3754
3747
7708
3753
40
21
1
20
51
50
26
25
10
1
12
110
5
8
14
13
IN
OUT
E
B
C
A
K

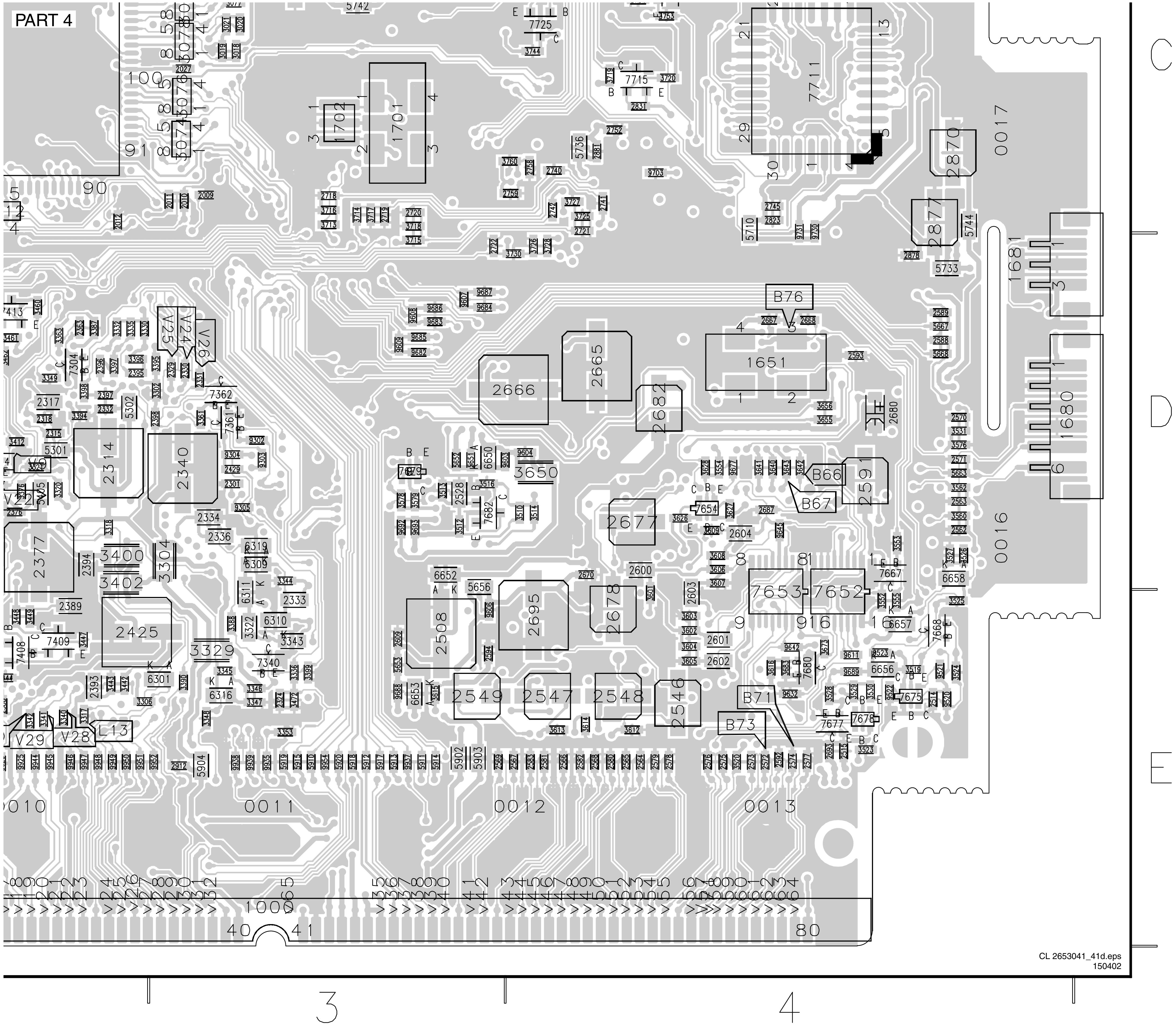
CL 2653041_41b.eps
150402

Layout Small Signal Board (Part 3 Top Side)


PART 3
C
D
E
1
2
3
1303
0014
7012
7001
1702
1701
1307
1309
1308
1305
1408
7323
5403
2413
1403
2314
2340
2377
2425
3400
3402
3304
3329
2508
2549
0009
0010
0011
1000
40
41
V30
V29
V28
L13
V22
V25
V24
V26
V1
V6
V10
V11

CL 2653041_41c.eps
150402

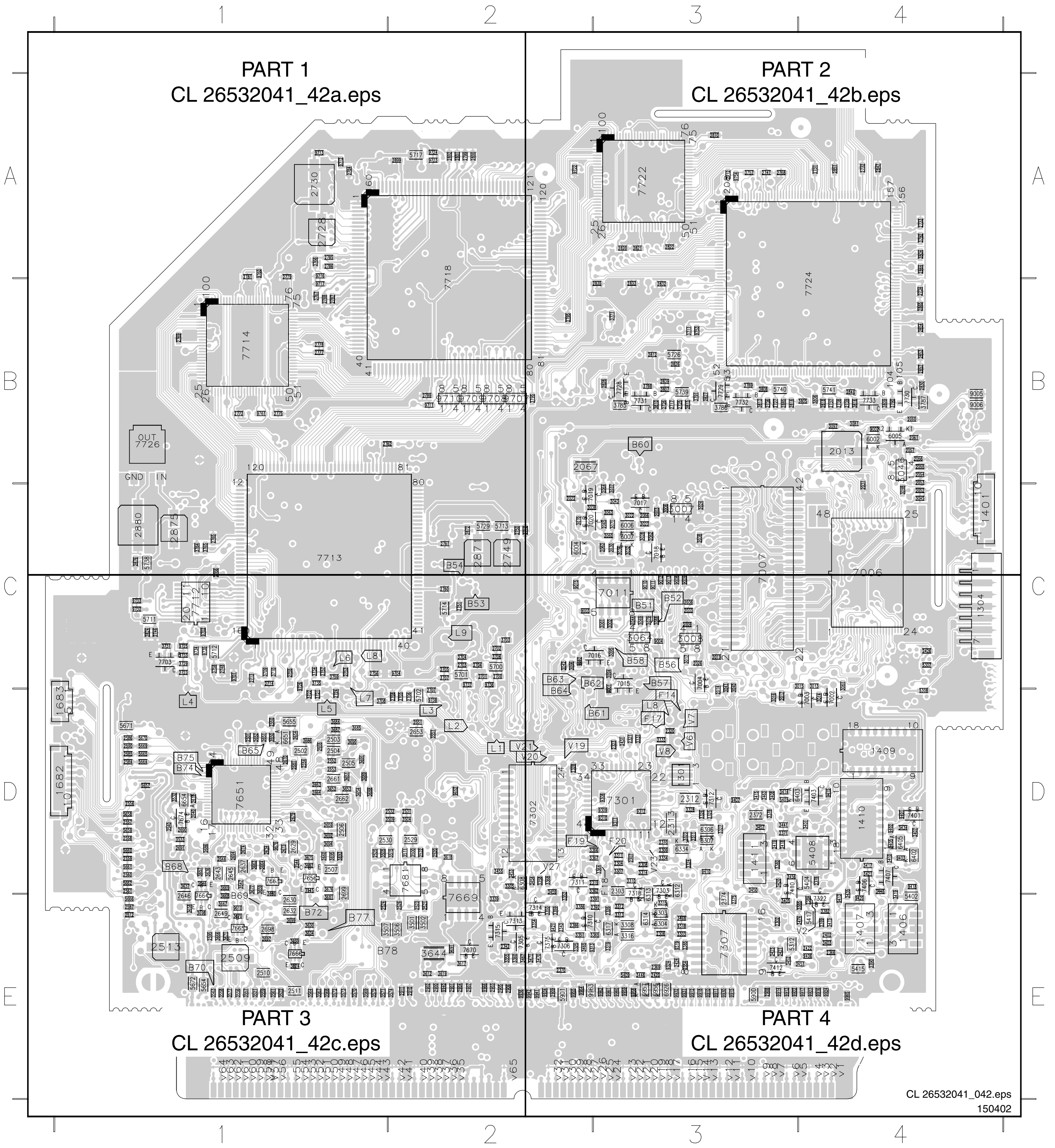
Layout Small Signal Board (Part 4 Top Side)


PART 4
C
D
E
3
4
7711
1701
1702
7725
7715
2870
2877
0017
1681
1680
1651
B76
2666
2665
2682
2680
3650
B66
B67
2591
2677
7654
7653
7652
0016
6658
2314
2340
2377
3400
3402
3304
2425
3329
V24
V25
V26
V28
V29
L13
2508
2695
2678
2549
2547
2548
2546
B71
B73
0010
0011
0012
0013
1000
40
41
80

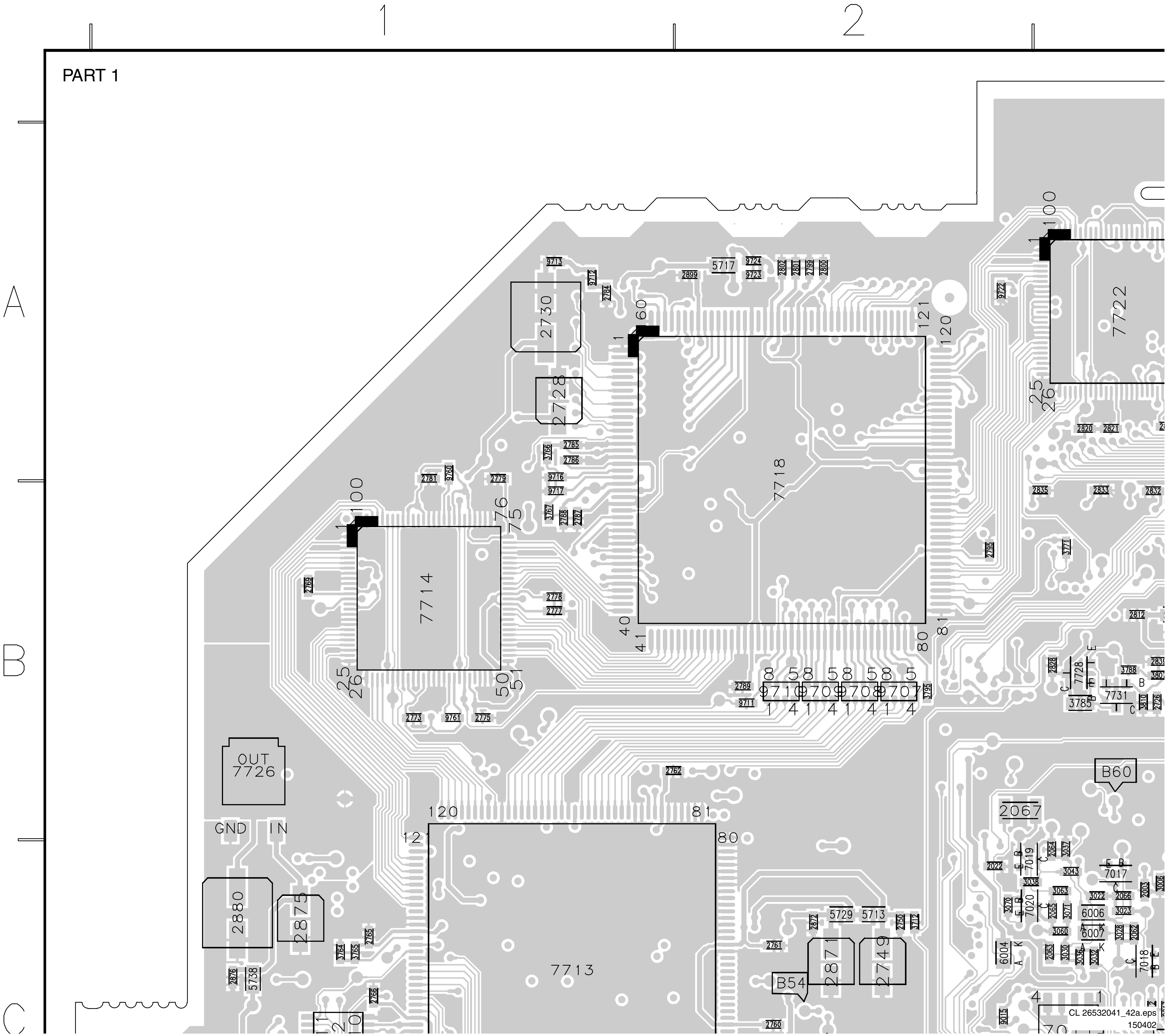
CL 2653041_41d.eps
150402

Layout Small Signal Board (Overview Bottom Side)

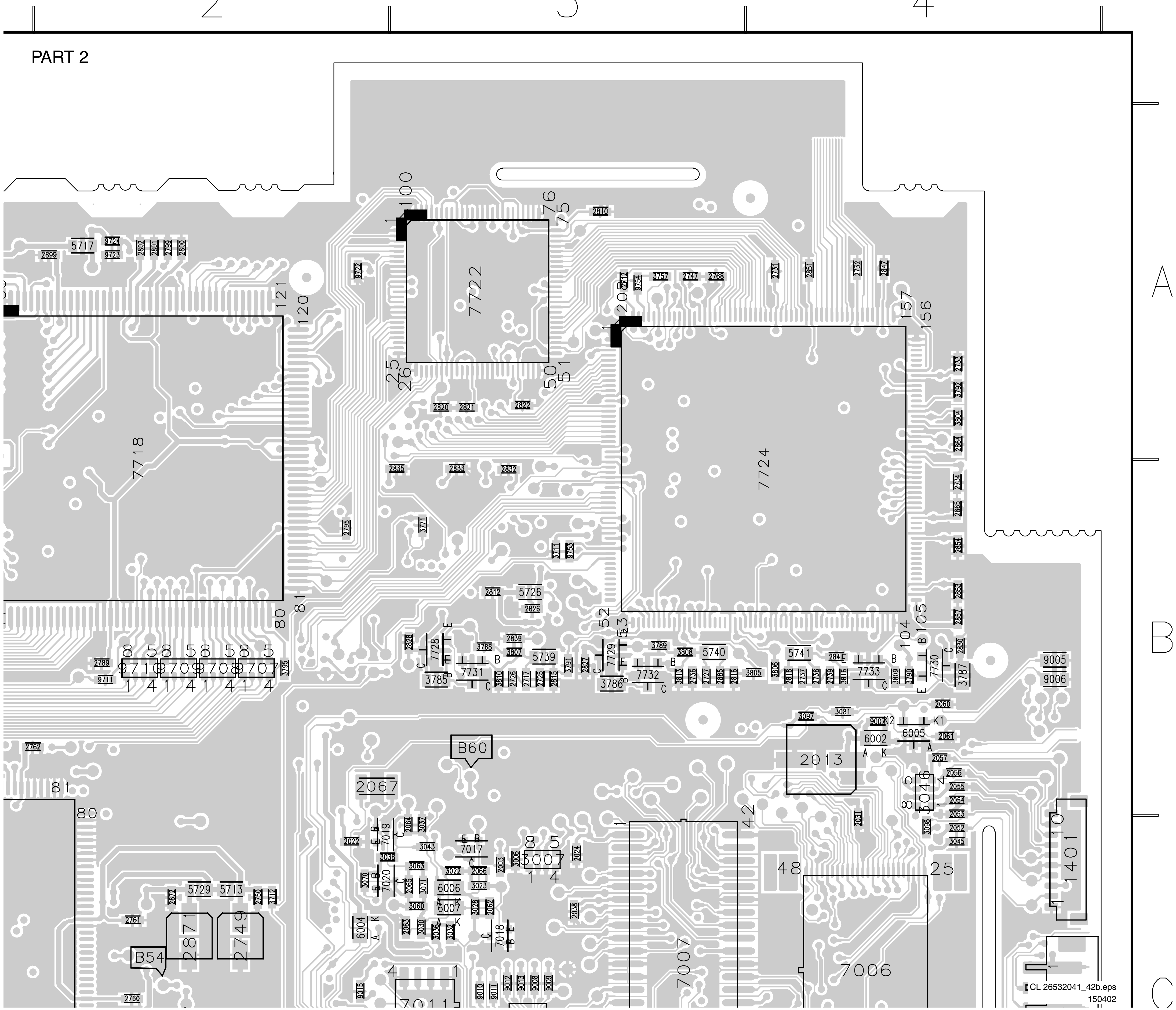
1301	D3
1304	C4
1305	D3
1306	D4
1307	D4
1308	D3
1401	C4
1406	E4
1407	E4
1409	D4
1410	D4
1411	D3
1682	D1
1683	D1
2003	C3
2013	B4
2014	D3
2017	D3
2019	C3
2022	C2
2024	C3
2026	C3
2031	C4
2033	C3
2036	C3
2038	C3
2052	C4
2053	B4
2054	B4
2055	B4
2056	B4
2057	B4
2060	B4
2061	B4
2062	C3
2063	C3
2064	C3
2065	C3
2066	C3
2067	B2
2302	E3
2303	D3
2304	D3
2306	E3
2307	D3
2308	D3
2309	D3
2310	D3
2311	D3
2312	D3
2313	D3
2319	D3
2320	D3
2321	D3
2323	D3
2325	D3
2326	E3
2328	D2
2342	E2
2343	E2
2354	E3
2366	E4
2369	E3
2370	E2
2371	D3
2372	D3
2374	E3
2375	E3
2378	D4
2384	E4
2385	E3
2386	E2
2390	E4
2392	E3
2399	E4
2402	E4
2418	D3
2419	D3
2420	E3
2421	E3
2422	E4
2423	E3
2424	E3
2426	C4
2431	D3
2501	D1
2502	D1
2503	D1
2504	D1
2505	D1
2506	D1
2507	D1
2509	E1
2510	E1
2511	E1
2512	E1
2513	E1
2520	D2
2521	E2
2522	D2
2523	E2
2524	E1
2525	D1
2526	E2
2529	D2
2530	D1
2531	D2
2532	D2
2550	D1
2551	D2
2552	D1
2553	D1
2554	D1
2555	D1
2556	D1
2557	D1
2558	D1
2559	D1
2560	D1
2561	D1
2584	D1
2585	D1
2586	D1
2587	E1
2590	D1
2595	E1
2610	D1
2611	D1
2612	E2
2629	D1
2630	E1
2632	E1
2634	D1
2637	D1
2640	D1
2643	D1
2644	D1
2645	D1
2646	E1
2649	E1
2651	D1
2652	D1
2653	D2
2654	D1
2659	D1
2660	D1
2661	D1
2662	D1
2663	D1
2664	D1
2673	D1
2674	D1
2679	D1
2681	D1
2686	D1
2690	D1
2691	D1
2694	D1
2697	E1
2698	E1
2699	D1
2700	C2
2701	C2
2702	C2
2703	C2
2704	C2
2705	C2
2706	D2
2707	D2
2708	D2
2712	A3
2713	C1
2714	C1
2717	B3
2723	C1
2724	D1
2725	B3
2726	B3
2727	B3
2728	A1
2730	A1
2731	A4
2732	A4
2733	A4
2734	B4
2736	B3
2737	B4
2738	B4
2739	B4
2746	C1
2747	A3
2748	C1
2749	C2
2750	C2
2751	C2
2753	C1
2755	C1
2756	C1
2757	C1
2760	C2
2761	C2
2762	B1
2765	C1
2766	C1
2768	A3
2769	B1
2773	B1
2775	B1
2777	B1
2778	B1
2779	A1
2781	A1
2784	A1
2785	A1
2786	A1
2787	B1
2788	B1
2789	B2
2795	B2
2799	A2
2800	A2
2801	A2
2802	A2
2810	A3
2812	B3
2815	B3
2816	B3
2818	B4
2820	A3
2821	A3
2822	A3
2824	C1
2826	B3
2827	B3
2828	B3
2830	B4
2832	B3
2833	B3
2835	B3
2839	B3
2841	B4
2847	A4
2851	A4
2853	B4
2854	B4
2857	B4
2864	A4
2865	B4
2871	C2
2872	C2
2875	C1
2876	C1
2880	C1
2885	B3
2899	A2
2900	E2
2901	E2
2902	E2
2903	E2
2904	E2
2905	E2
2906	E2
2907	E2
2908	E3
2909	E2
2910	E2
2911	E2
3001	C3
3002	C3
3006	C3
3007	C3
3008	C3
3009	C3
3013	C4
3014	D4
3015	C4
3016	D3
3017	C3
3022	C3
3023	C3
3028	C3
3030	C3
3032	C3
3036	C3
3037	C3
3038	C2
3040	C3
3041	C3
3042	C2
3043	C3
3044	C3
3045	C4
3046	B4
3060	C3
3061	C4
3063	C3
3064	C3
3069	C3
3070	C2
3071	C3
3079	C3
3081	B4
3088	C3
3094	C3
3095	C3
3096	C2
3097	B4
3098	C4
3303	E3
3305	D2
3307	D3
3308	E3
3310	D3
3311	D3
3312	E3
3313	E3
3314	D3
3315	E3
3316	E3
3319	E3
3323	D3
3324	D3
3325	E2
3326	D3
3327	D3
3328	D3
3331	D3
3333	D3
3334	D3
3339	E2
3350	E2
3351	E2
3352	E2
3354	E2
3355	E2
3358	D2
3359	E2
3360	E2
3362	D3
3364	D3
3365	E3
3366	D3
3367	D3
3368	D2
3378	D3
3380	D3
3382	E4
3385	E4
3386	E2
3391	E3
3401	D4
3403	E4
3405	E3
3407	D4
3408	D3
3410	D4
3414	D3
3415	D3
3417	D4
3419	E4
3420	D3
3421	D4
3434	D4
3435	D4
3441	D3
3445	D4
3446	E3
3450	D3
3451	E4
3452	E3
3453	D2
3454	D2
3455	D2
3456	D3
3457	D3
3459	D2
3463	D3
3465	E2
3467	E2
3468	E3
3470	E2
3471	E2
3473	E4
3474	E4
3500	D2
3501	E2
3502	E2
3504	D2
3505	D1
3506	E2
3507	E1
3509	D2
3511	D2
3515	D2
3521	E1
3522	E1
3532	D1
3533	D1
3540	D1
3544	D1
3545	D1
3546	D1
3547	D1
3550	D1
3551	D2
3556	E1
3557	E1
3558	E1
3559	E1
3561	E1
3563	E1
3564	E1
3567	E1
3568	E1
3569	E1
3570	E1
3571	E1
3572	E1
3573	E1
3574	E2
3575	E1
3577	E1
3617	E2
3618	D2
3619	E2
3624	E1
3630	E1
3634	E1
3636	D1
3637	D1
3639	E1
3644	E2
3651	D1
3652	D1
3653	D1
3654	D1
3657	D1
3658	E1
3659	D1
3663	D1
3664	D1
3666	E1
3667	E1
3668	E1
3669	D1
3670	E1
3671	E1
3675	D1
3676	D1
3677	D1
3680	D1
3681	E1
3682	D1
3684	D1
3685	D1
3686	D1
3687	D1
3688	D1
3689	D1
3690	D1
3691	D1
3692	D1
3693	D1
3694	D1
3695	D1
3698	E1
3699	E1
3703	C2
3704	C2
3705	D2
3706	C2
3707	C2
3708	D1
3709	C1
3710	C1
3711	B3
3712	C2
3721	D1
3722	D1
3729	C1
3731	C1
3733	C1
3734	C1
3735	C1
3757	A3
3758	C1
3759	C1
3764	C1
3765	C1
3766	A1
3767	B1
3771	B3
3785	B3
3786	B3
3787	B4
3788	B3
3789	B3
3790	B4
3791	B3
3792	A4
3795	B2
3804	A4
3805	B4
3806	B4
3807	B3
3808	B3
3809	B4
3810	B3
3813	B3
3816	B4
5307	C4
5308	D4
5312	E3
5401	D3
5402	E4
5404	D4
5408	D4
5409	E3
5415	E4
5417	E4
5654	E1
5655	D1
5657	D1
5658	D1
5659	D1
5660	D1
5661	D1
5662	D1
5664	D1
5665	D1
5666	E1
5669	D1
5670	D1
5671	D1
5672	E1
5700	C2
5701	C2
5702	D2
5711	C1
5712	C1
5713	C2
5714	C2
5717	A2
5726	B3
5729	C2
5738	C1
5739	B3
5740	B3
5741	B4
5900	E3
5901	E2
6002	B4
6004	C2
6005	B4
6006	C3
6007	C3
6303	E3
6304	E3
6306	D3
6307	D3
6308	E2
6312	D3
6313	D3
6314	E3
6317	E3
6334	D3
6402	D4
6403	D3
6405	D4
6651	D1
6654	D1
6926	E3
6956	E3
6957	E3
7002	D4
7003	D4
7004	D3
7006	C4
7007	C4
7011	C3
7015	D3
7016	C2
7017	B3
7018	C3
7019	B2
7020	C2
7301	D2
7302	D2
7303	E3
7305	E2
7306	E2
7307	E3
7310	E3
7311	D2
7312	D3
7313	E2
7314	E2
7315	E2
7318	D3
7322	E4
7375	E2
7401	D4
7403	D4
7406	D4
7407	D4
7410	D3
7412	E3
7651	D1
7656	D1
7663	D1
7664	E1
7665	E1
7666	E1
7669	D2
7670	E2
7674	D1
7681	D1
7703	C1
7712	C1
7713	C1
7714	B1
7718	A2
7722	A3
7724	B4
7726	B1
7728	B3
7729	B3
7730	B4
7731	B3
7732	B3
7733	B4
9001	D3
9002	C2
9003	C2
9004	C3
9005	B4
9006	B4
9007	B4
9008	C3
9009	C3
9010	C3
9011	C3
9012	C3
9013	C3
9015	C2
9308	D3
9309	D3
9310	D3
9311	D3
9312	D3
9313	E2
9318	E3
9319	E3
9324	E3
9401	D4
9402	D4
9403	D4
9405	D4
9406	E4
9407	D3
9410	D3
9413	E4
9415	D4
9418	D4
9420	E4
9421	E2
9610	E1
9652	D2
9676	D1
9691	E2
9701	C1
9702	C1
9704	C2
9707	B2
9708	B2
9709	B2
9710	B2
9711	B2
9712	A1
9713	A1
9716	A1
9717	B1
9722	A2
9723	A2
9724	A2
9725	C1
9726	C1
9732	C1
9733	C1
9734	C1
9735	C1
9736	C2
9737	C2
9738	D2
9753	B3
9754	A3
9760	A1
9761	B1
9910	E3
9911	E3
9912	E3
9913	E3
9914	E3
9915	E3
9916	E4
9917	E4
9918	E3
9922	E3
9923	E4
9924	E4
9930	E3
9931	E3
9932	E3
9934	E2
9936	E2
9940	E2
9941	E2
9942	E2
9955	E2
9958	E3
9959	E3
9960	E3
9961	E3
9962	E3
9963	E2
9964	E2
9965	E4
9966	E2



Layout Small Signal Board (Part 1 Bottom Side)

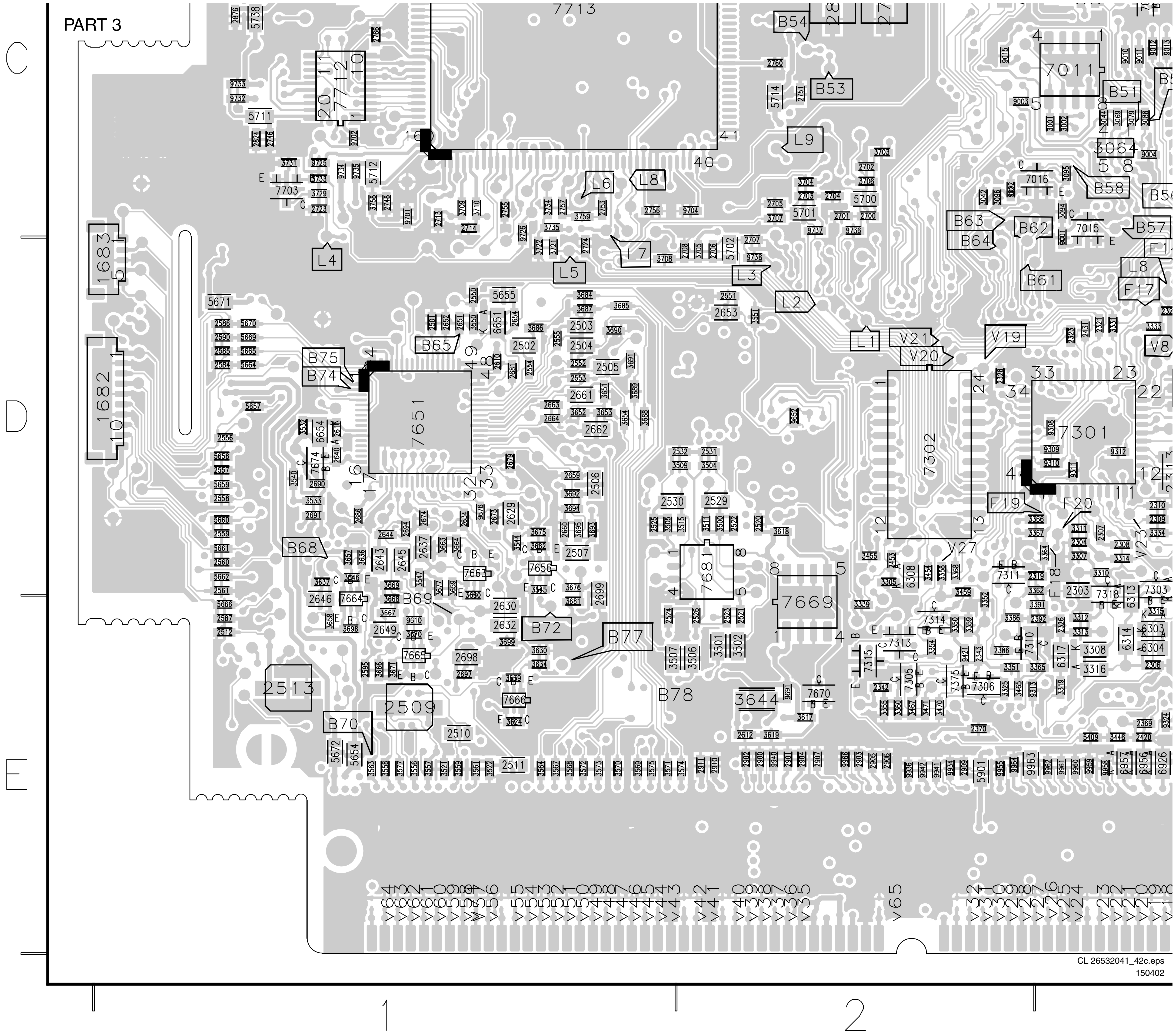

1
2
A
B
C
PART 1
2730
2728
7718
7714
7713
7722
7726
OUT
GND
IN
2880
2875
2871
2749
5717
5729
5713
B54
B60
2067
9710
9709
9708
9707
7728
7731
7017
7018
7019
7020
6004
6006
6007
3785
2899
2762
2761
2760
2773
9761
2775
2781
9760
2779
2785
2786
9716
9717
3766
3767
2778
2777
2769
2789
9711
2820
2821
2835
2833
2832
2812
2022
3043
3038
3063
3022
2066
3023
3060
9015
CL 26532041_42a.eps
150402

Layout Small Signal Board (Part 2 Bottom Side)


2
3
4
A
B
C
PART 2
7722
7718
7724
7007
7006
2013
1401
2067
2871
2749
B60
B54
5717
5726
5739
5740
5741
5729
5713
9710
9709
9708
9707
9005
9006
7728
7731
7729
7732
7733
7730
3785
3786
3787
6002
6005
3046
7019
7017
7020
6006
6007
6004
7018
5007
7011
2899
2810
2820
2821
2822
2835
2833
2832
2812
2826
2762
2761
2760
9711
2789
100
76
75
121
120
25
26
50
51
206
157
156
52
53
105
104
81
80
42
48
25

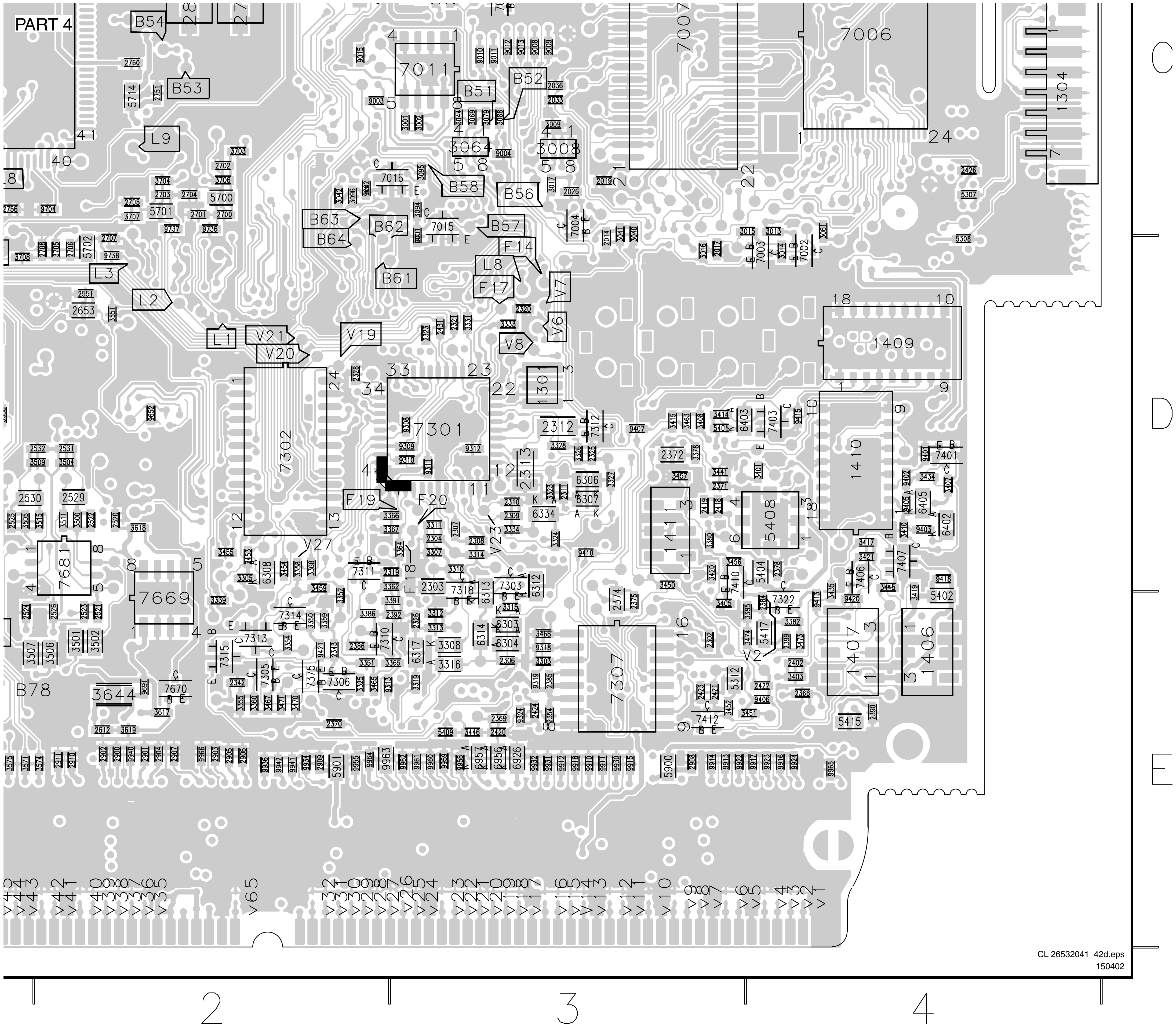
CL 26532041_42b.eps
150402

Layout Small Signal Board (Part 3 Bottom Side)


PART 3
C
D
E
1
2
7713
7712
7703
7651
7302
7301
7011
7016
7015
7681
7669
7670
7664
7663
7665
7666
7656
7674
7311
7313
7314
7315
7318
7303
7305
7306
7310
7375
1683
1682
2513
2509
2510
2511
3644
3064
B54
B53
B51
B58
B63
B64
B62
B57
B61
B65
B75
B74
B68
B69
B72
B77
B78
B70
L9
L6
L8
L7
L5
L4
L3
L2
L1
V21
V20
V19
V8
V27
F17
F19
F20
F18
V23
5711
5712
5700
5701
5702
5714
5671
5655
6651
6654
6308
6313
6314
6317
2503
2504
2502
2505
2661
2662
2506
2507
2530
2529
2630
2632
2629
2643
2645
2646
2649
2637
2698
2699
2303
3308
3316
3507
3506
3501
3502
5901
9963
6957
6956
6926
V64
V63
V62
V61
V60
V59
V58
V57
V56
V55
V54
V53
V52
V51
V50
V49
V48
V47
V46
V45
V44
V43
V42
V41
V40
V39
V38
V37
V36
V35
V65
V32
V31
V30
V29
V28
V27
V26
V25
V24
V23
V22
V21
V20

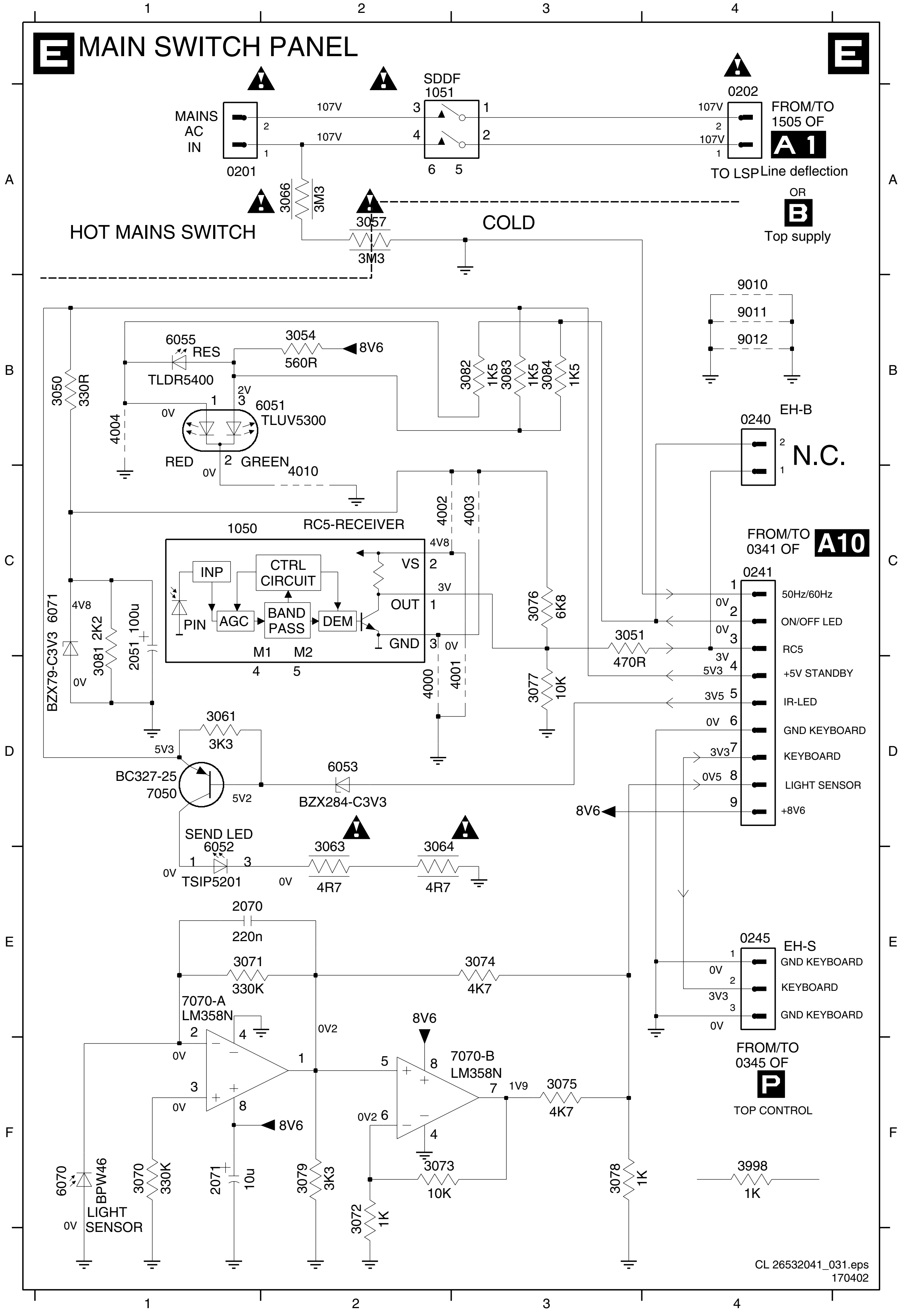
CL 26532041_42c.eps
150402

Layout Small Signal Board (Part 4 Bottom Side)


PART 4
C
D
E
2
3
4
B54
B53
L9
B52
B51
7011
3064
3008
7007
7006
1304
B58
B56
7016
7015
B63
B64
B62
B57
F14
L8
F17
B61
V7
L3
L2
L1
V21
V20
V19
V6
V8
1409
7302
7301
1301
2312
1410
2313
6306
6307
6334
F19
F20
V23
1411
5408
7681
7669
7311
7318
6313
7303
6312
2303
7314
7313
7310
6317
3308
3316
6304
6314
7307
5417
1407
1406
V2
7306
7305
7315
7375
B78
3644
7670
7412
5415
5402
5404
7322
7406
7407
7410
6405
6402
7401
7403
6403
2372
2374
5900
5901
9963
V65
V27
F18

CL 26532041_42d.eps
150402

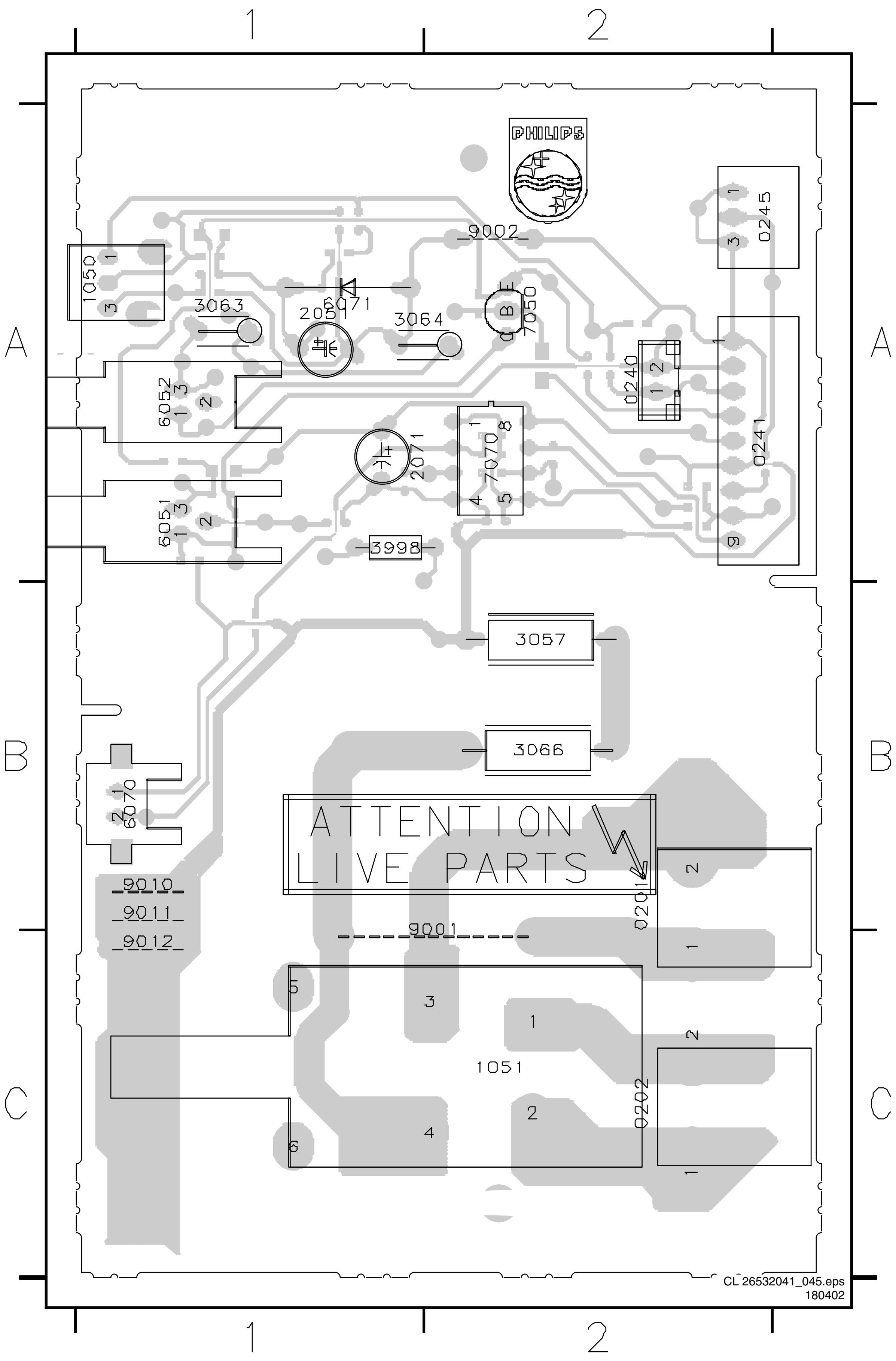
Mains Switch Panel


E MAIN SWITCH PANEL E
MAINS AC IN
0201
SDDF 1051
107V
0202
FROM/TO 1505 OF A 1
TO LSP Line deflection
OR
B Top supply
3066 3M3
3057 3M3
HOT MAINS SWITCH
COLD
9010
9011
9012
6055 RES
TLDR5400
3054 560R
8V6
3050 330R
4004
6051 TLUV5300
RED
GREEN
4010
3082 1K5
3083 1K5
3084 1K5
0240 EH-B
N.C.
1050 RC5-RECEIVER
INP
CTRL CIRCUIT
PIN
AGC
BAND PASS
DEM
VS
OUT
GND
M1
M2
4002
4003
4000
4001
3076 6K8
3077 10K
3051 470R
FROM/TO 0341 OF A10
0241
50Hz/60Hz
ON/OFF LED
RC5
+5V STANDBY
IR-LED
GND KEYBOARD
KEYBOARD
LIGHT SENSOR
+8V6
BZX79-C3V3 6071
3081 2K2
2051 100u
3061 3K3
BC327-25 7050
6053 BZX284-C3V3
SEND LED 6052
TSIP5201
3063 4R7
3064 4R7
0245 EH-S
GND KEYBOARD
KEYBOARD
GND KEYBOARD
FROM/TO 0345 OF P
TOP CONTROL
2070 220n
3071 330K
3074 4K7
7070-A LM358N
7070-B LM358N
3075 4K7
3073 10K
3072 1K
3078 1K
3998 1K
6070 BPW46
LIGHT SENSOR
3070 330K
2071 10u
3079 3K3
CL 26532041_031.eps
170402

0201	A1
0202	A4
0240	B4
0241	C4
0245	E4
1050	C1
1051	A2
2051	C1
2070	E1
2071	F1
3050	B1
3051	C3
3054	B2
3057	A2
3061	D1
3063	E2
3064	E2
3066	A2
3070	F1
3071	E1
3072	F2
3073	F2
3074	E3
3075	F3
3076	C3
3077	D3
3078	F3
3079	F2
3081	D1
3082	B3
3083	B3
3084	B3
3998	F4
4000	D2
4001	D3
4002	C2
4003	C3
4004	B1
4010	C2
6051	B1
6052	E1
6053	D2
6055	B1
6070	F1
6071	C1
7050	D1
7070-A	E1
7070-B	F2
9010	B4
9011	B4
9012	B4

Personal Notes:

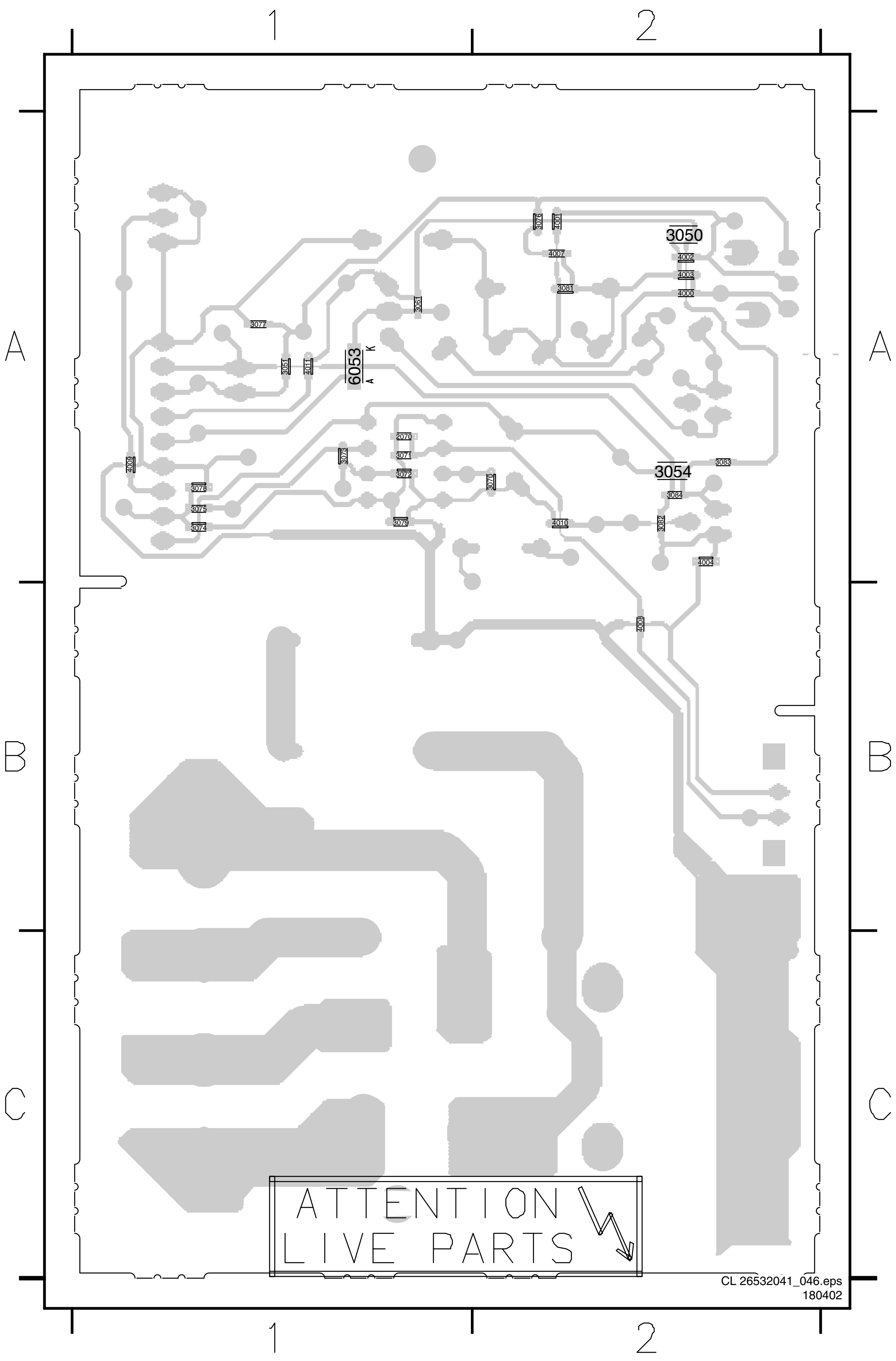
Layout Mains Switch Panel (Top Side)


1
2
A
B
C
PHILIPS
9002
0245
1050
3063
2051
6071
3064
7050
C B E
0240
0241
6052
6051
2071
7070
3998
3057
3066
6070
ATTENTION
LIVE PARTS
0201
9010
9011
9012
9001
1051
0202

CL 26532041_045.eps
180402

0201	B2
0202	C2
0240	A2
0241	A2
0245	A2
1050	A1
1051	C2
2051	A1
2071	A1
3057	B2
3063	A1
3064	A2
3066	B2
3998	A1
6051	A1
6052	A1
6070	B1
6071	A1
7050	A2
7070	A2
9001	B2
9002	A2
9010	B1
9011	B1
9012	C1

Layout Mains Switch Panel (Bottom Side)


1
2
A
B
C
3050
6053
3054
ATTENTION
LIVE PARTS

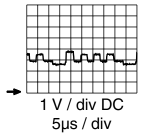
CL 26532041_046.eps
180402

2070	A1
3050	A2
3051	A1
3054	A2
3061	A1
3070	A2
3071	A1
3072	A1
3073	A1
3074	A1
3075	A1
3076	A2
3077	A1
3078	A1
3079	A1
3081	A2
3082	A2
3083	A2
3084	A2
4000	A2
4001	A2
4002	A2
4003	A2
4004	A2
4007	A2
4008	B2
4009	A1
4010	A2
4011	A1
6053	A1

CRT Panel

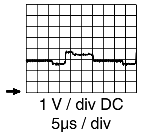
0031 C7
0033 E7
0035 A7
1237-A G14
1237-B G11
1237-C G13
1237-D E11
1237-E G13
1237-F F11
1237-G F11
1237-H H11
1237-I E11
1298-A G14
1298-B G13
1298-C E11
1298-D G13
1298-E E11
1298-F F11
1298-G G11
1298-H E11
1298-I G11
1298-J H11
1298-K G14
1424 H2
1434 H15
1435 D11
1940 B1
2301 B4
2302 D4
2303 F4
2312 B10
2313 I5
2317 I14
2318 H12
2319 G9
2324 I14
2338 A7
2339 C7
2340 E7
2341 F5
2342 C9
2347 B13
2348 B13
2357 I10
2358 C13
2359 C13
2403 H8
2404 H8
2405 G7
2407 A15
2408 G1
2409 H3
2501 B3
2502 B4
2503 D3
2504 D4
2505 F3
2506 F4
2510 A10
2511 A10
3301 I5
3303 E1
3304 E1
3305 A12
3334 G12
3338 F10
3339 E10
3340 E10
3341 I4
3345 G8
3347 H14
3348 H13
3349 G12
3350 E9
3351 E9
3352 F9
3401 H5
3402 G3
3403 H4
3404 G4
3501 C2
3502 B2
3503 B3
3504 B3
3505 A3
3506 C4
3507 A4
3508 B4
3509 A4
3510 B5
3511 E2
3512 D3
3513 E3
3514 E3
3515 B8
3516 C8
3517 B9
3518 C9
3519 D4
3520 D5
3521 G2
3522 F2
3523 G3
3524 G3
3525 E3
3526 G4
3527 E4
3528 G4
3529 E4
3530 F5
3531 C3
3532 E4
3533 C4
3534 D4
3535 A2
3536 C2
3537 E2
3538 A2
3539 C3
3540 C2
3541 E2
3542 E2
3543 G2
3544 B10
3999 D1
5303 B12
5304 G9
5308 B12
5309 I4
5310 I4
5400 H5
5500 B3
5501 D3
5502 F3
6301 E9
6302 D10
6303 E9
6305 D9
6306 D9
6307 E9
6400 H7
6405 H7
6406 C9
6407 C9
6420 B9
6421 A9
6422 A9
6426 B8
6427 A8
6428 A8
6430 B10
7330 A6
7340 C6
7350 E6
7500 B2
7501 B4
7502 B5
7503 D2
7504 D4
7505 D5
7506 F2
7507 F4
7508 F5
9300 B14
9301 G10
9302 G11
9303 B6
9304 B6
9305 B7
9306 D6
9307 D6
9308 F6
9309 F6
9314 D7
9315 A12
9401 H7
9402 A14
9403 B14
9501 B4
9502 D4
9503 F4
9504 C14
9505 C15

F4



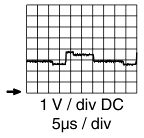
1 V / div DC
5µs / div

F5



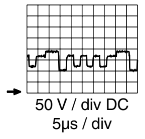
1 V / div DC
5µs / div

F6



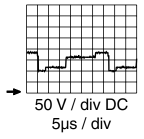
1 V / div DC
5µs / div

F7



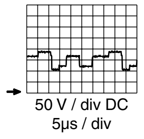
50 V / div DC
5µs / div

F8



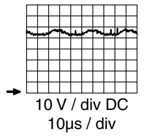
50 V / div DC
5µs / div

F9

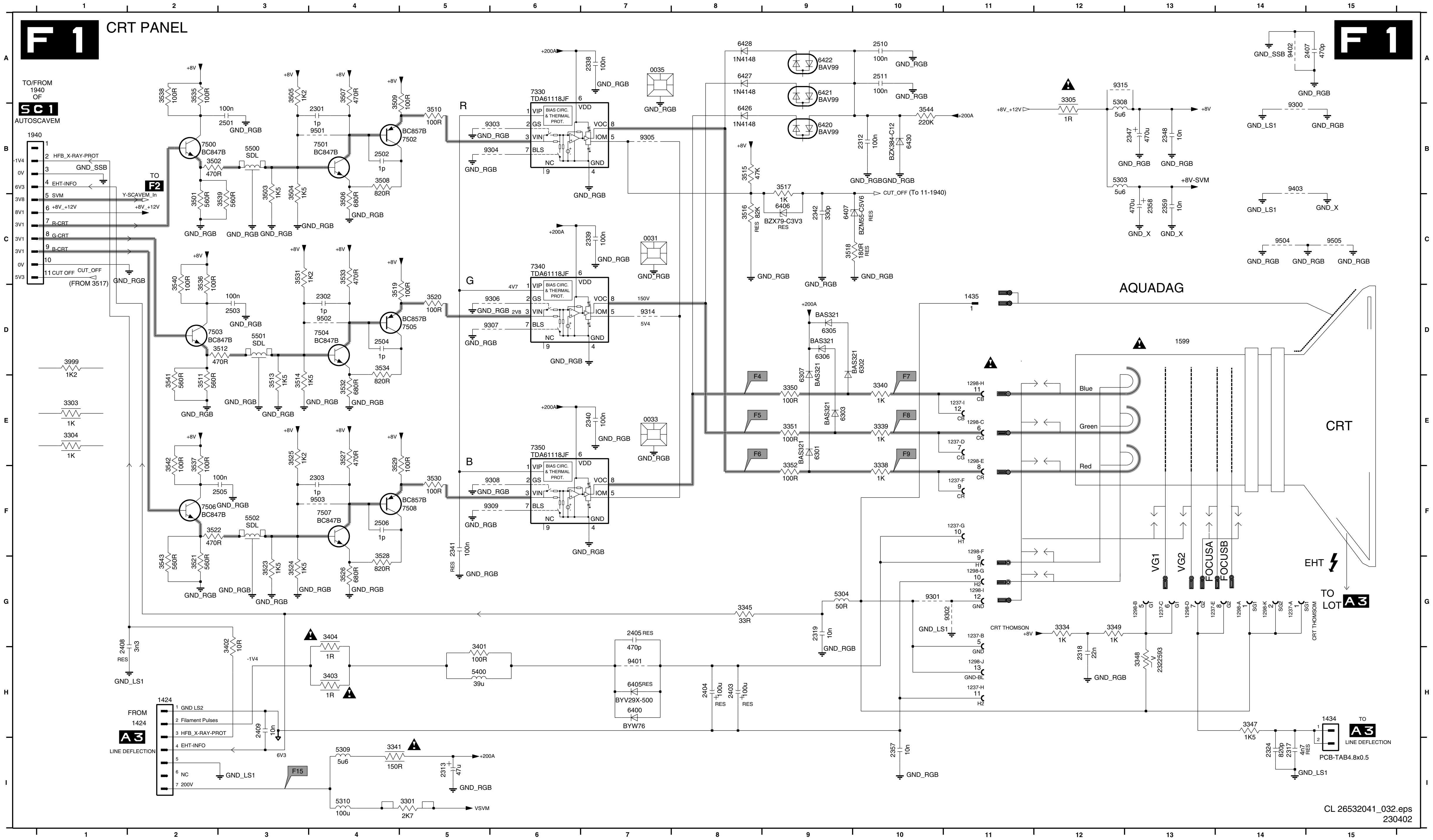


50 V / div DC
5µs / div

F15



10 V / div DC
10µs / div

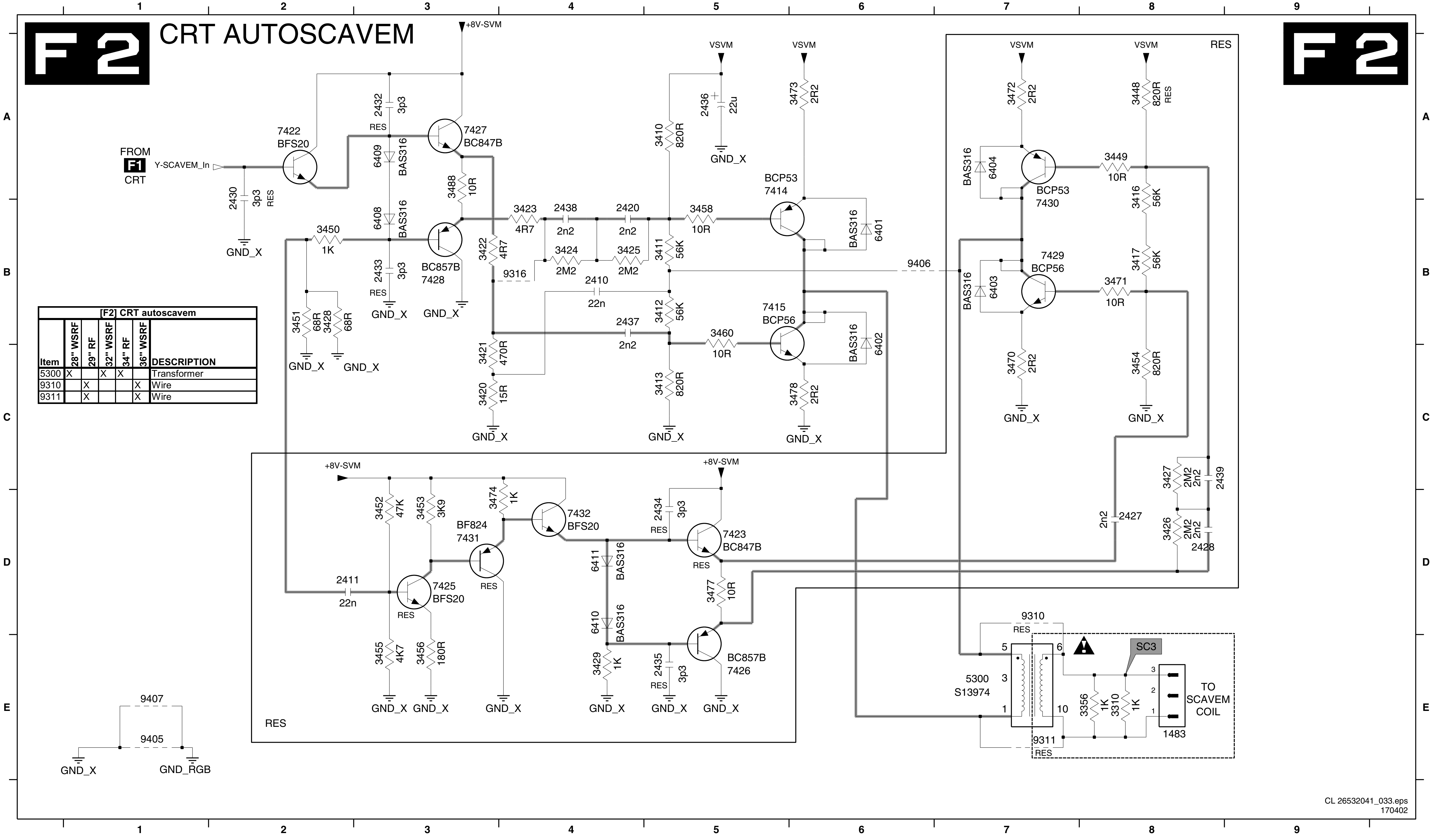

F 1
CRT PANEL
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
A
B
C
D
E
F
G
H
I
TO/FROM
1940
OF
SC1
AUTOSCAVEM
1940
HFB_X-RAY-PROT
GND_SSB
EHT-INFO
SVM
+8V_+12V
R-CRT
G-CRT
B-CRT
CUT OFF
CUT_OFF
(FROM 3517)
TO
F2
Y-SCAVEM_In
7500
BC847B
7501
BC847B
7502
BC857B
7503
BC847B
7504
BC847B
7505
BC857B
7506
BC847B
7507
BC847B
7508
BC857B
5500
SDL
5501
SDL
5502
SDL
R
G
B
7330
TDA6111JF
7340
TDA6111JF
7350
TDA6111JF
VIP
GS
VIN
BLS
NC
VDD
VOC
IOM
GND
BIAS CIRC. & THERMAL PROT.
GND_RGB
+200A
+8V
0031
0033
0035
6428
1N4148
6427
1N4148
6426
1N4148
6422
BAV99
6421
BAV99
6420
BAV99
BZX384-C12
6430
6406
BZX79-C3V3
6407
BZM55-C5V6
CUT_OFF (To 11-1940)
BAS321
6301
6302
6303
6305
6306
6307
F4
F5
F6
F7
F8
F9
F15
3999
1K2
3303
1K
3304
1K
3404
1R
3403
1R
3401
100R
5400
39u
2405
470p
9401
6405
BYV29X-500
6400
BYW76
1424
FROM
A3
LINE DEFLECTION
GND LS2
Filament Pulses
HFB_X-RAY-PROT
EHT-INFO
NC
200V
GND_LS1
5309
5u6
3341
150R
5310
100u
3301
2K7
VSVM
3345
33R
5304
50R
9301
9302
CRT THOMSON
3334
1K
3349
1K
3348
2322593
3347
1K5
1434
TO
LINE DEFLECTION
PCB-TAB4.8x0.5
1435
AQUADAG
1599
Blue
Green
Red
CRT
VG1
VG2
FOCUSA
FOCUSB
EHT
TO
LOT
A3
9315
3305
1R
5308
5u6
5303
5u6
+8V_+12V
+8V-SVM
GND_X
9300
9403
9504
9505
9402
2407
470p
GND_SSB
GND_LS1
1298-H
1237-I
1298-C
1237-D
1298-E
1237-F
1237-G
1298-F
1298-G
1298-I
1237-B
1298-J
1237-H

CL 26532041_032.eps
230402

[F1] CRT panel						
Item	28" WSRF	29" RF	32" WSRF	34" RF	36" WSRF	DESCRIPTION
1237				X		CRT socket 9p female
1298	X	X			X	CRT socket 10p female
1298			X			CRT socket 11p female
2324	X					1N
2324			X			1N5
2324		X		X	X	4N7
2403		X		X	X	100U
2404		X		X	X	100U
2405		X		X	X	470P
3303				X		FUSE 1K
3304	X	X	X		X	FUSE 1K
3402	X		X		X	10R
3402		X		X		150R
3403		X			X	FUSE 1R
3403				X		FUSE 1R5
3403	X		X			FUSE 1R
3404		X			X	FUSE 1R
3404				X		FUSE 1R5
3510					X	100R
3510	X		X			150R
3510				X		220R
3510		X				560R
3520	X				X	150R
3520				X		220R
3520			X			390R
3520		X				560R
3530	X					150R
3530				X		220R
3530					X	270R
3530			X			390R
3530		X				560R
3999				X		1K5
3999	X					1K8
3999		X				2K2
3999					X	2K7
3999			X			3K9
5400	X		X			33U
5400				X		18U
5400		X				27U
5400					X	39U
6405		X		X	X	BYV29X-500
9301	X	X		X	X	Jumper
9302			X			Jumper
9303	X	X	X		X	Jumper
9306	X	X	X		X	Jumper
9308	X	X	X		X	Jumper
9401	X		X			Jumper

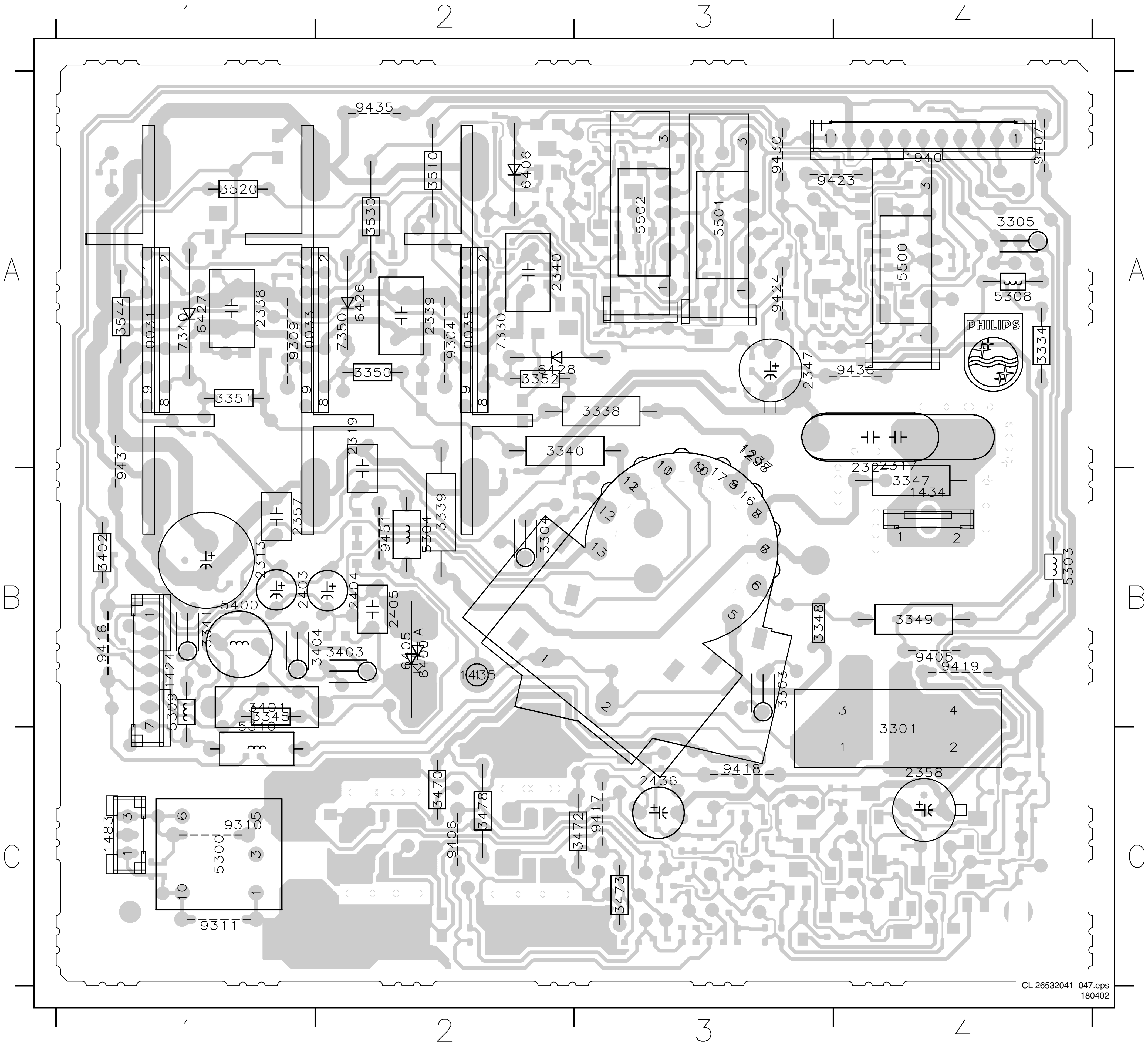
CRT/ Auto SCAVEM Panel

1483	E8
2410	B4
2411	D2
2420	B4
2427	D8
2428	D8
2430	A2
2432	A3
2433	B3
2434	D5
2435	E5
2436	A5
2437	B4
2438	B4
2439	C8
3310	E8
3356	E8
3410	A5
3411	B5
3412	B5
3413	C5
3416	A8
3417	B8
3420	C3
3421	C3
3422	B3
3423	B4
3424	B4
3425	B4
3426	D8
3427	C8
3428	B2
3429	E4
3448	A8
3449	A8
3450	B2
3451	B2
3452	D3
3453	D3
3454	C8
3455	E3
3456	E3
3458	B5
3460	B5
3470	C7
3471	B8
3472	A7
3473	A6
3474	D3
3477	D5
3478	C6
3488	A3
5300	E7
6401	B6
6402	B6
6403	B7
6404	A7
6408	B3
6409	A3
6410	D4
6411	D4
7414	A5
7415	B5
7422	A2
7423	D5
7425	D3
7426	E5
7427	A3
7428	B3
7429	B7
7430	A7
7431	D3
7432	D4
9310	D7
9311	E7
9316	B4
9405	E1
9406	B6
9407	E1


F 2
CRT AUTOSCAVEM
F 2
+8V-SVM
VSVM
RES
FROM
F1
CRT
Y-SCAVEM_In
7422 BFS20
7427 BC847B
7428 BC857B
7414 BCP53
7415 BCP56
7430 BCP53
7429 BCP56
7425 BFS20
7431 BF824
7432 BFS20
7423 BC847B
7426 BC857B
2430 3p3 RES
2432 3p3 RES
2433 3p3 RES
6409 BAS316
6408 BAS316
3488 10R
3450 1K
3451 68R
3428 68R
3423 4R7
3422 4R7
2438 2n2
2420 2n2
3424 2M2
3425 2M2
9316
2410 22n
2437 2n2
3421 470R
3420 15R
3410 820R
2436 22u
3411 56K
3412 56K
3413 820R
3458 10R
3460 10R
3473 2R2
3478 2R2
6401 BAS316
6402 BAS316
9406
3472 2R2
3448 820R RES
6404 BAS316
6403 BAS316
3449 10R
3416 56K
3417 56K
3471 10R
3470 2R2
3454 820R
3427 2M2
3426 2M2
2439 2n2
2428 2n2
2427 2n2
2411 22n
3452 47K
3453 3K9
3474 1K
3455 4K7
3456 180R
2434 3p3 RES
6411 BAS316
6410 BAS316
3477 10R
3429 1K
2435 3p3 RES
9310 RES
9311 RES
5300 S13974
SC3
3356 1K
3310 1K
1483
TO SCAVEM COIL
9407
9405
GND_X
GND_RGB
CL 26532041_033.eps
170402

[F2] CRT autoscavem						
Item	28" WSRF	29" RF	32" WSRF	34" RF	36" WSRF	DESCRIPTION
5300	X		X	X		Transformer
9310		X			X	Wire
9311		X			X	Wire

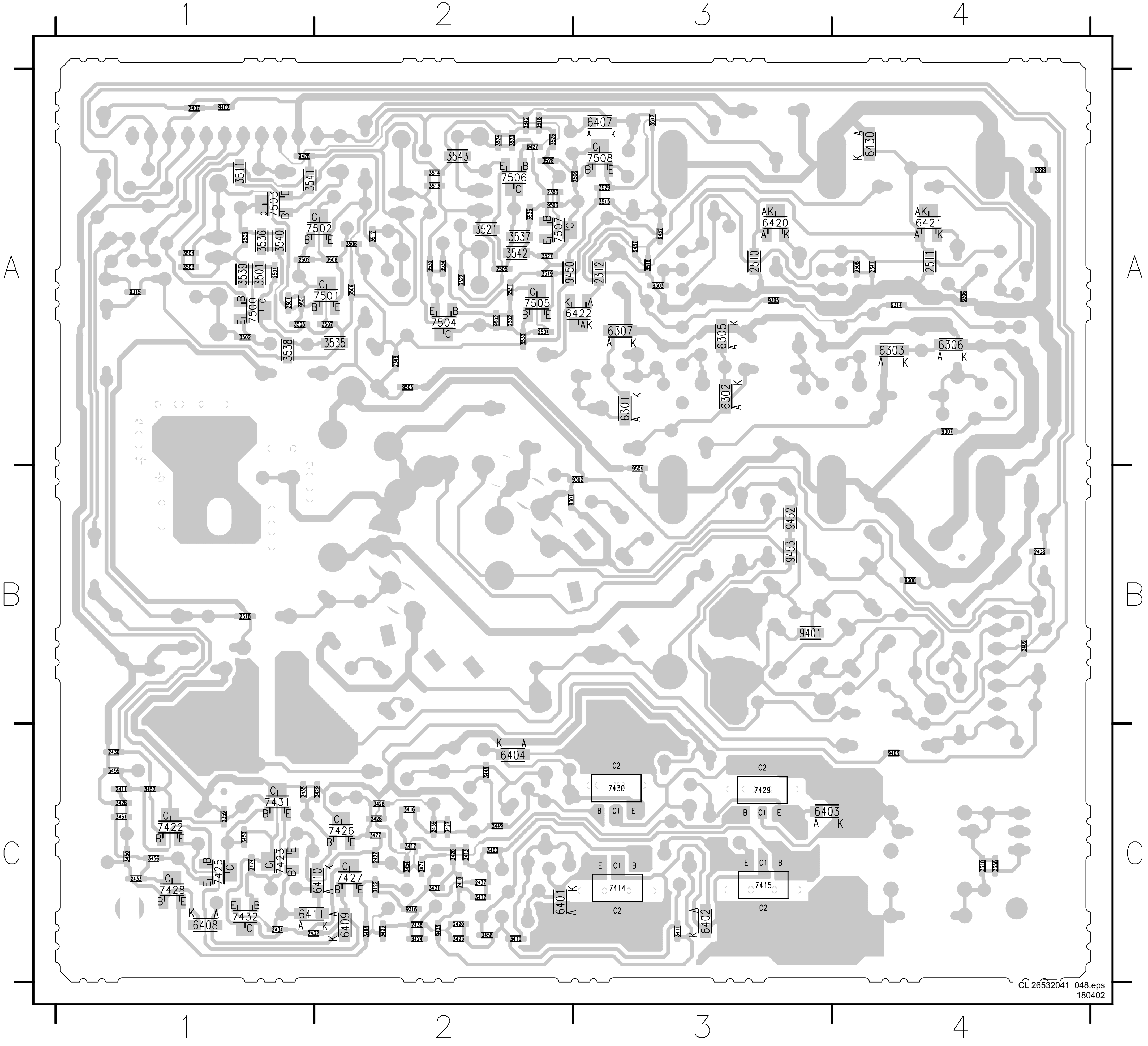
Layout CRT / Auto SCAVEM Panel (Top Side)


1
2
3
4
A
B
C
9435
3520
3510
3530
6406
5502
5501
9430
1940
9423
9407
3305
5500
5308
PHILIPS
3334
3544
0031
7340
6427
2338
9309
0033
7350
6426
2339
9304
0035
7330
2340
9424
2347
9436
3351
3350
3352
6428
3338
3340
9431
2319
3339
1237
2324
2317
3347
1434
2357
9451
5304
3304
3402
2313
2403
2404
2405
5400
5303
9416
3341
3404
3403
6405
6400
1435
3348
3349
9405
9419
1424
5309
3401
3345
5310
3303
3301
9418
2436
2358
3470
3478
9406
3472
9417
3473
1483
9310
5300
9311

CL 26532041_047.eps
180402

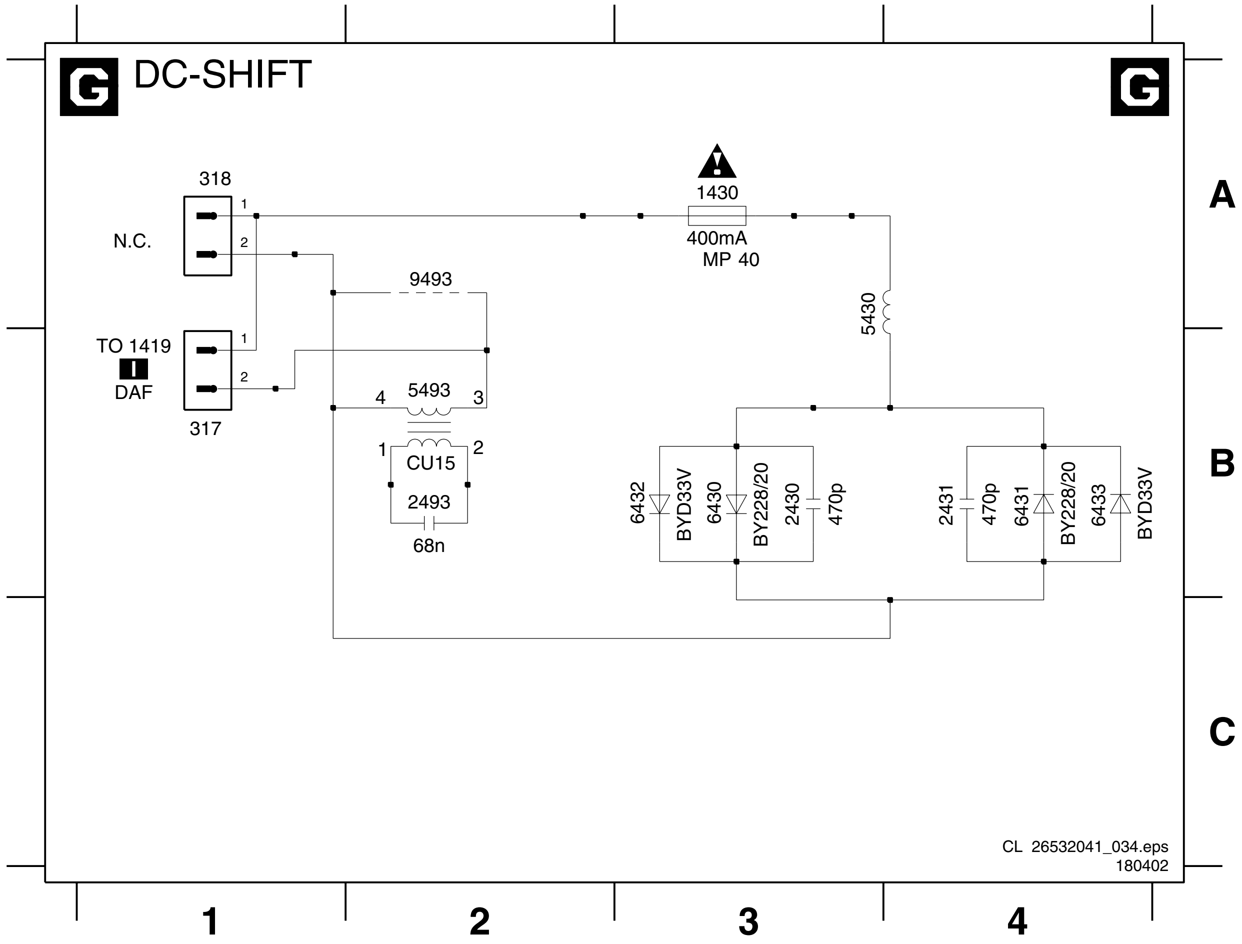
Part	Location
0031	A1
0033	A1
0035	A2
1237	A3
1298	C3
1424	B1
1434	B4
1435	B2
1483	C1
1940	A4
2313	B1
2317	A4
2319	A2
2324	A4
2338	A1
2339	A2
2340	A2
2347	A3
2357	B1
2358	C4
2403	B1
2404	B1
2405	B2
2436	C3
3301	B4
3303	B3
3304	B2
3305	A4
3334	A4
3338	A3
3339	B2
3340	B2
3341	B1
3345	B1
3347	B4
3348	B4
3349	B4
3350	A2
3351	A1
3352	A2
3401	B2
3402	B1
3403	B2
3404	B1
3470	C2
3472	C2
3473	C3
3478	C2
3510	A2
3520	A1
3530	A2
3544	A1
5300	C1
5303	B4
5304	B2
5308	A4
5309	C1
5310	C1
5400	B1
5500	A4
5501	A3
5502	A3
6400	B2
6405	B2
6406	A2
6426	A2
6427	A1
6428	A2
7330	A2
7340	A1
7350	A2
9304	A2
9309	A1
9310	C1
9311	C1
9405	B4
9406	C2
9407	A4
9416	B1
9417	C3
9418	C3
9419	B4
9423	A4
9424	A3
9430	A3
9431	A1
9435	A2
9436	A4

Layout CRT / Auto SCAVEM Panel (Bottom Side)



2301	A1
2302	A2
2303	A2
2312	A3
2318	B1
2341	A4
2342	A2
2348	A2
2359	C1
2407	A1
2408	B4
2409	B4
2410	C2
2411	C1
2420	C2
2427	C2
2428	C2
2430	C1
2432	C1
2433	C1
2434	C1
2435	C1
2437	C2
2438	C2
2439	C2
2501	A1
2502	A1
2503	A1
2504	A2
2505	A2
2506	A3
2510	A3
2511	A4
3310	C4
3356	C4
3410	C2
3411	C3
3412	C2
3413	C2
3416	C2
3417	C2
3420	C2
3421	C2
3422	C2
3423	C2
3424	C2
3425	C2
3426	C2
3427	C2
3428	C1
3429	C2
3448	C2
3449	C2
3450	C1
3451	C1
3452	C1
3453	C1
3454	C2
3455	C1
3456	C1
3458	C2
3460	C2
3471	C2
3474	C1
3477	C2
3488	C2
3501	A1
3502	A1
3503	A1
3504	A1
3505	A1
3506	A2
3507	A2
3508	A2
3509	A2
3511	A1
3512	A2
3513	A2
3514	A2
3515	A3
3516	A3
3517	A3
3518	A2
3519	A2
3521	A2
3522	A2
3523	A2
3524	A2
3525	A2
3526	A2
3527	A2
3528	A2
3529	A3
3531	A2
3532	A2
3533	A2
3534	A2
3535	A2
3536	A1
3537	A2
3538	A1
3539	A1
3540	A1
3541	A1
3542	A2
3543	A2
3999	A4
6301	A3
6302	A3
6303	A4
6305	A3
6306	A4
6307	A3
6401	C2
6402	C3
6403	C3
6404	C2
6407	A3
6408	C1
6409	C2
6410	C1
6411	C1
6420	A3
6421	A4
6422	A3
6430	A4
7414	C3
7415	C3
7422	C1
7423	C1
7425	C1
7426	C2
7427	C2
7428	C1
7429	C3
7430	C3
7431	C1
7432	C1
7500	A1
7501	A2
7502	A2
7503	A1
7504	A2
7505	A2
7506	A2
7507	A3
7508	A3
9300	B4
9301	B2
9302	B3
9303	A3
9305	A3
9306	A4
9307	A4
9308	A4
9314	A4
9315	A1
9316	C2
9401	B3
9402	A1
9403	C4
9427	A2
9428	A1
9432	A3
9433	C2
9437	A3
9450	A2
9452	B3
9453	B3
9501	A1
9502	A2
9503	A2
9504	B3
9505	A2

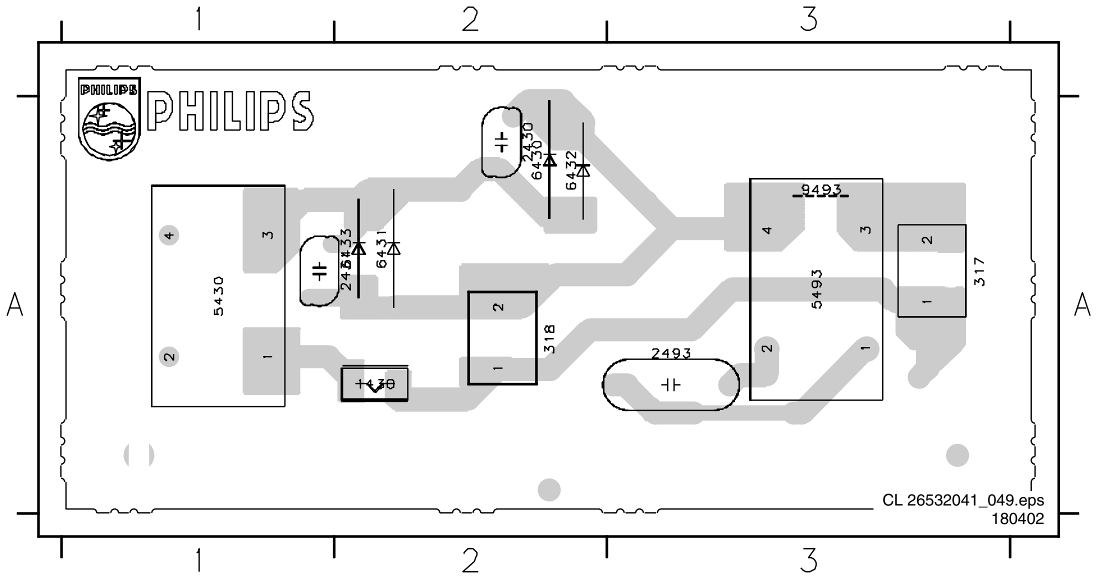
DC Shift Panel


G
DC-SHIFT
G
318
N.C.
1430
400mA
MP 40
9493
TO 1419
DAF
317
4
5493
3
1
CU15
2
2493
68n
5430
6432
BYD33V
6430
BY228/20
2430
470p
2431
470p
6431
BY228/20
6433
BYD33V
A
B
C
1
2
3
4
CL 26532041_034.eps
180402

317	B1
318	A1
1430	A3
2430	B3
2431	B4
2493	B2
5430	A3
5493	B2
6430	B3
6431	B4
6432	B3
6433	B4

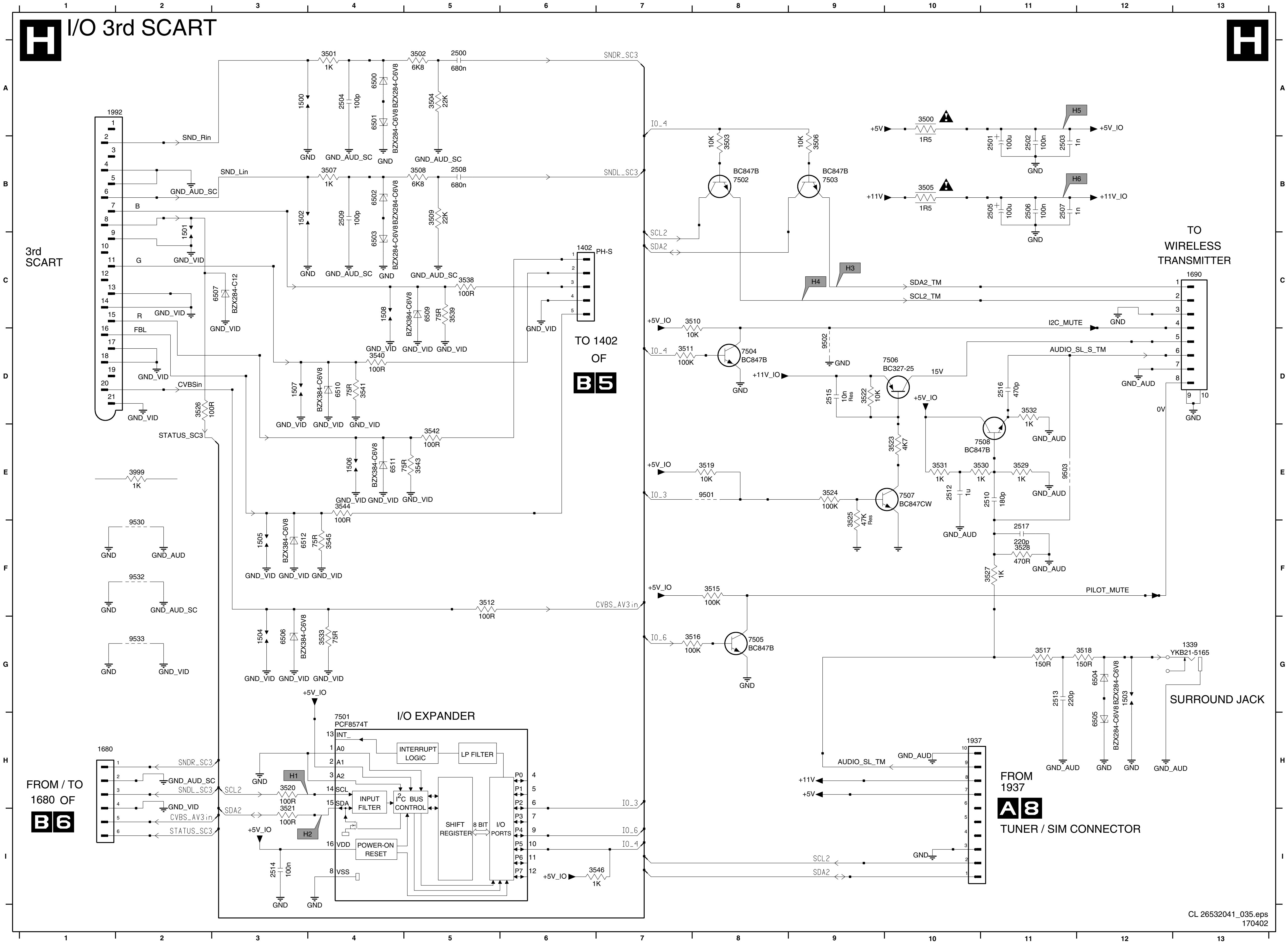
Layout DC Shift Panel

317	A3	2430	A2	5430	A1	6431	A2	9493	A3
318	A2	2431	A1	5493	A3	6432	A2		
1430	A2	2493	A3	6430	A2	6433	A2		


1
2
3
A
A
PHILIPS
5430
2430
6430
6432
2433
6431
1430
318
2493
9493
5493
317
CL 26532041_049.eps
180402

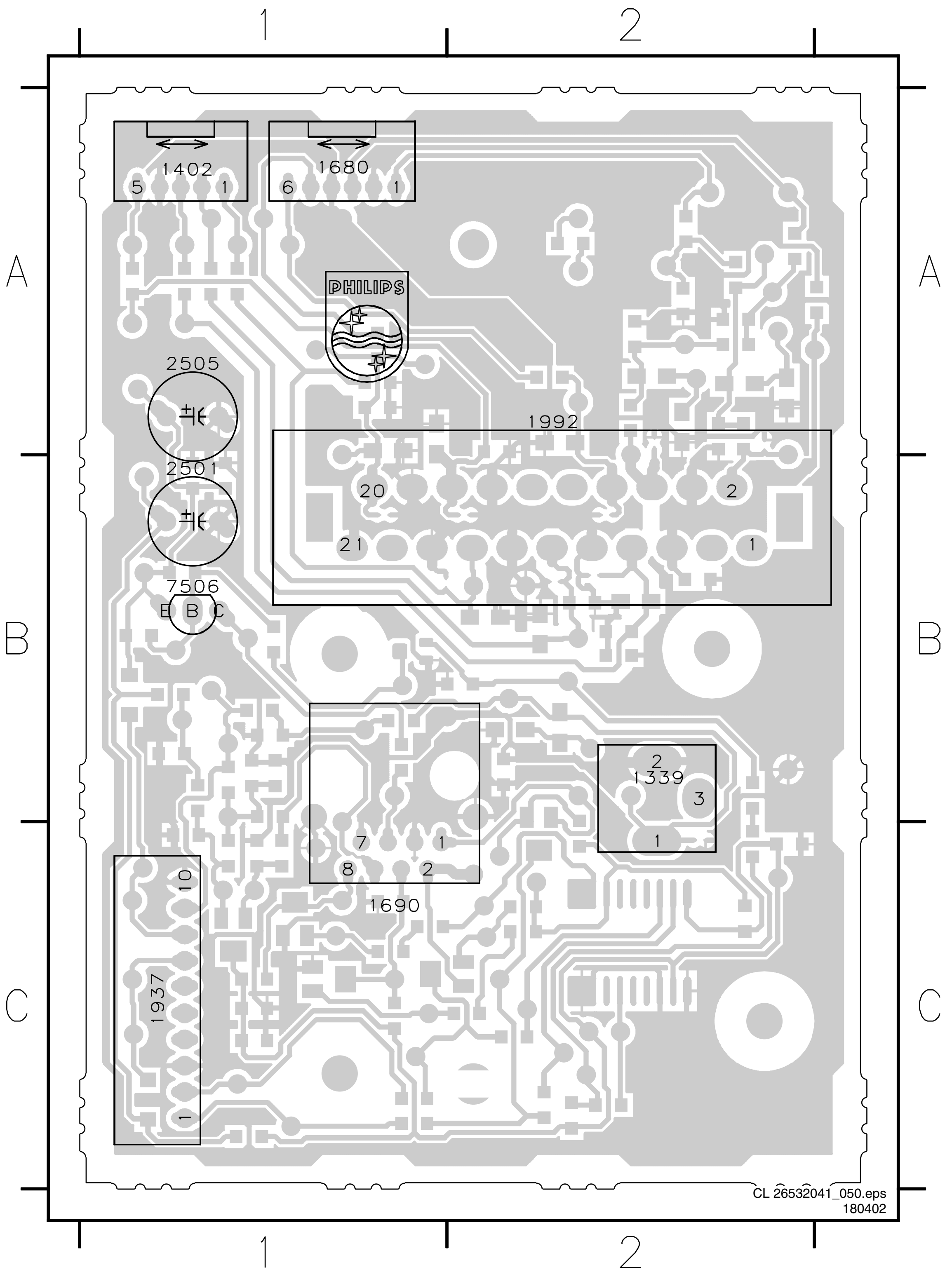
Personal Notes:

I/O 3rd Scart


H
I/O 3rd SCART
3rd SCART
1992
SND_Rin
SND_Lin
GND_AUD_SC
GND_VID
CVBSin
STATUS_SC3
SNDR_SC3
SNDL_SC3
SCL2
SDA2
IO_4
IO_3
IO_6
CVBS_AV3in
1402 PH-S
TO 1402 OF B5
I/O EXPANDER
7501 PCF8574T
INTERRUPT LOGIC
LP FILTER
INPUT FILTER
I2C BUS CONTROL
SHIFT REGISTER
8 BIT
I/O PORTS
POWER-ON RESET
1680
FROM / TO 1680 OF B6
TO WIRELESS TRANSMITTER
1690
SDA2_TM
SCL2_TM
I2C_MUTE
AUDIO_SL_S_TM
PILOT_MUTE
+5V_IO
+11V_IO
1339 YKB21-5165
SURROUND JACK
1937
FROM 1937 A8
TUNER / SIM CONNECTOR
AUDIO_SL_TM
BC847B
BC327-25
BC847CW
BZX284-C6V8
BZX384-C6V8
BZX284-C12
CL 26532041_035.eps
170402

1339	G13
1402	C6
1500	A3
1501	B2
1502	B3
1503	G12
1504	G3
1505	F3
1506	E4
1507	D3
1508	C4
1680	H1
1690	C13
1937	H11
1992	A2
2500	A5
2501	B11
2502	B11
2503	B11
2504	A4
2505	B11
2506	B11
2507	B11
2508	B5
2509	B4
2510	E11
2512	E10
2513	G11
2514	I3
2515	D9
2516	D11
2517	F11
3500	A10
3501	A4
3502	A5
3503	B8
3504	A5
3505	B10
3506	B9
3507	B4
3508	B5
3509	B5
3510	C8
3511	D7
3512	F5
3515	F8
3516	G8
3517	G11
3518	G12
3519	E8
3520	H3
3521	I3
3522	D9
3523	E10
3524	E9
3525	E9
3526	D2
3527	F11
3528	F11
3529	E11
3530	E11
3531	E10
3532	D11
3533	G4
3538	C5
3539	C5
3540	D4
3541	D4
3542	E5
3543	E5
3544	E4
3545	F4
3546	I7
3999	E2
6500	A4
6501	A4
6502	B4
6503	C4
6504	G12
6505	H12
6506	G3
6507	C3
6509	C5
6510	D4
6511	E4
6512	F3
7501	H4
7502	B8
7503	B9
7504	D8
7505	G8
7506	D10
7507	E10
7508	E11
9501	E8
9502	D9
9503	E11
9530	F2
9532	F2
9533	G2

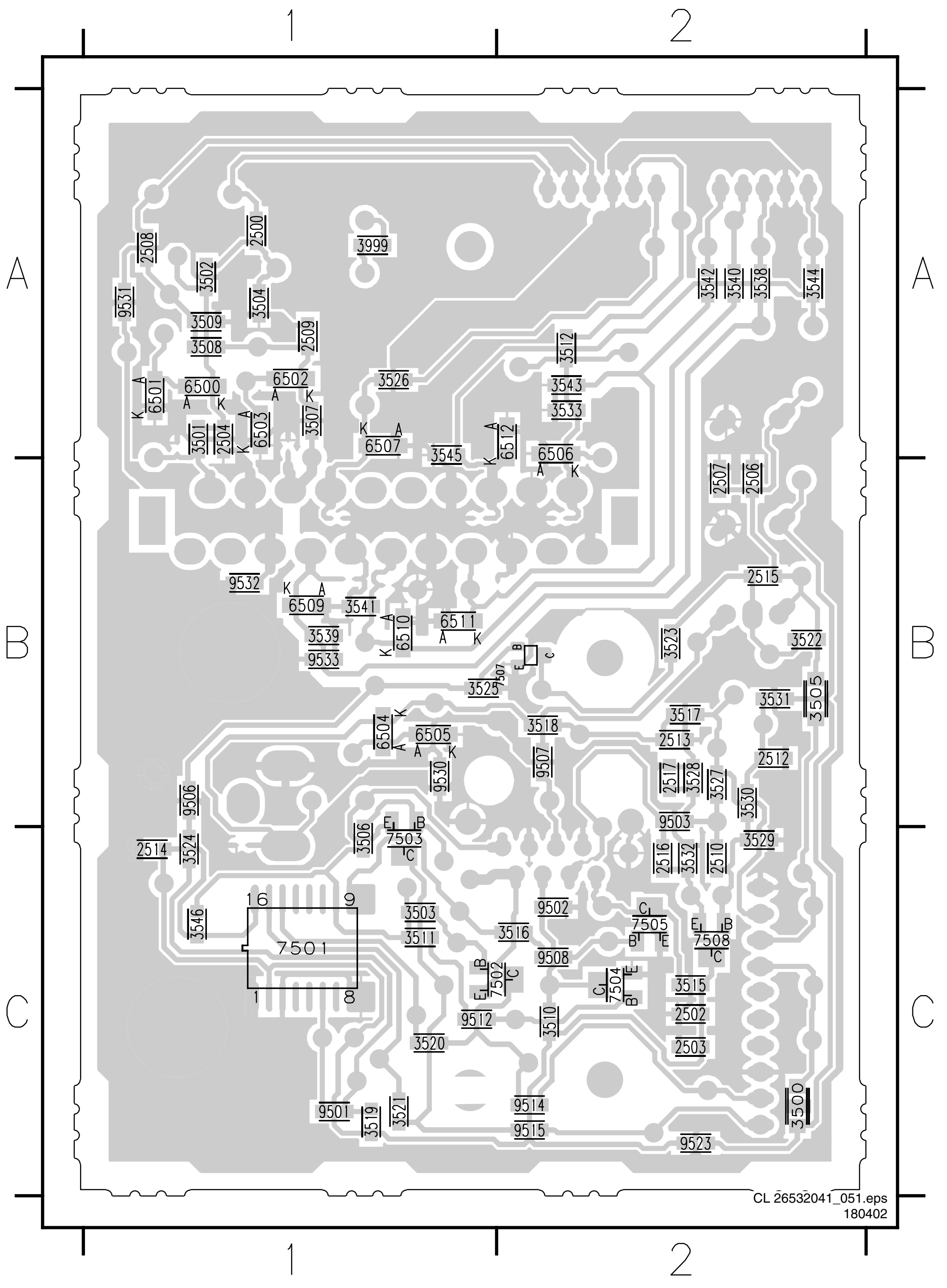
Layout I/O 3rd Scart (Top Side)


1
2
A
B
C
1402
5
1
1680
6
1
PHILIPS
2505
2501
1992
20
2
21
1
7506
E B C
2
1339
3
1
7
1
8
2
1690
10
1937
1

CL 26532041_050.eps
180402

1339	B2
1402	A1
1680	A1
1690	B1
1937	C1
1992	A2
2501	B1
2505	A1
7506	B1

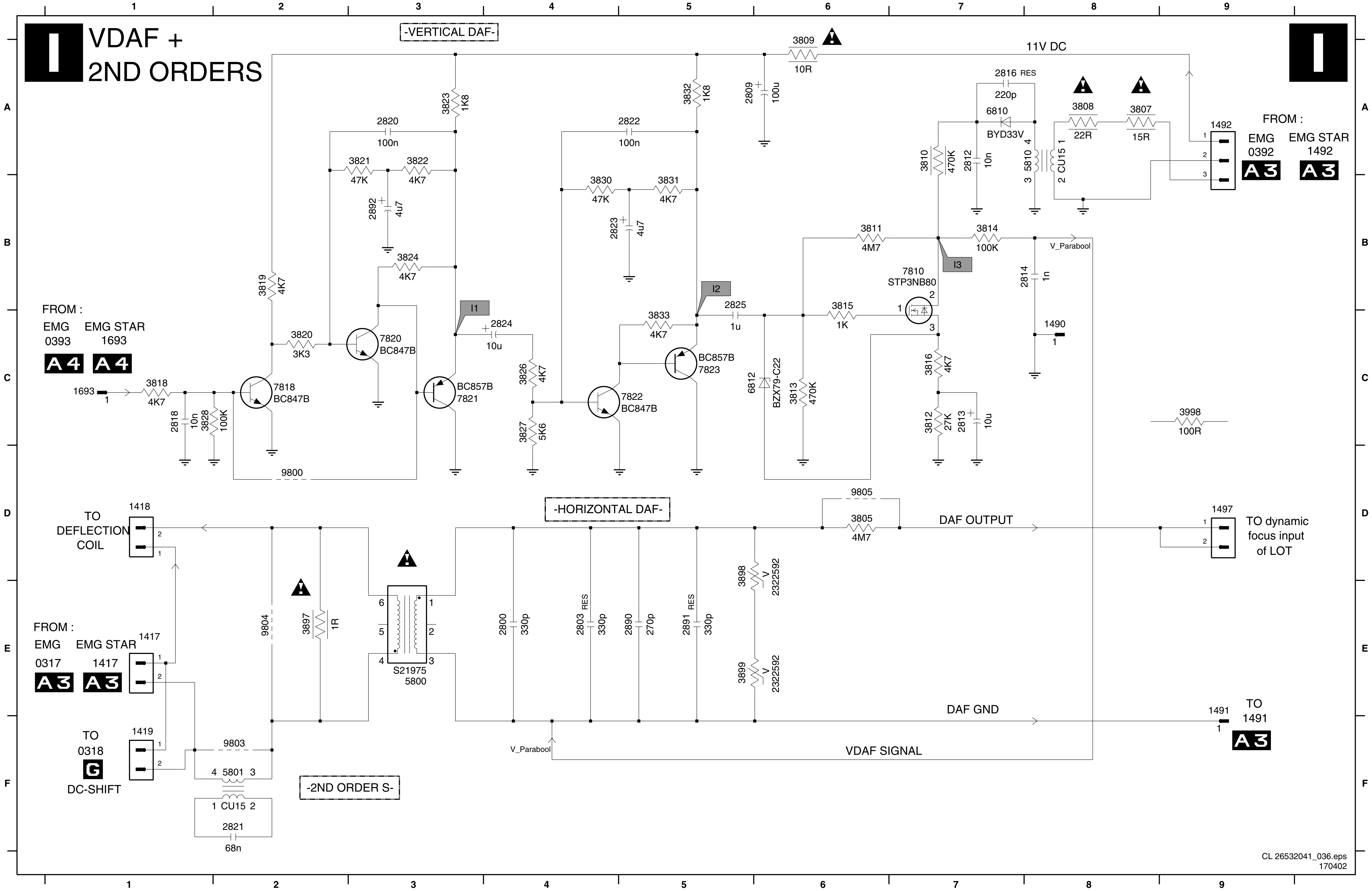
Layout I/O 3rd Scart (Bottom Side)


1
2
A
B
C
2508
2500
3999
9531
3502
3504
3509
3508
2509
6501
6500
6502
3526
3512
3543
3533
3542
3540
3538
3544
3501
2504
6503
3507
6507
6512
3545
6506
2507
2506
9532
6509
3541
6510
6511
3539
9533
3523
3522
2515
3525
3531
3505
6504
6505
3518
3517
2513
2512
9506
9530
9507
2517
3528
3527
3530
2514
3524
3506
7503
9503
2516
3532
2510
3529
16
9
7501
1
8
3546
3503
3511
3516
9502
7505
7508
9508
7502
7504
3515
2502
2503
9512
3510
3520
9501
3519
3521
9514
9515
9523
3500

CL 26532041_051.eps
180402

2500	A1	3999	A1
2502	C2	6500	A1
2503	C2	6501	A1
2504	A1	6502	A1
2506	B2	6503	A1
2507	B2	6504	B1
2508	A1	6505	B1
2509	A1	6506	A2
2510	C2	6507	B1
2512	B2	6509	B1
2513	B2	6510	B1
2514	C1	6511	B1
2515	B2	6512	A2
2516	C2	7501	C1
2517	B2	7502	C1
3500	C2	7503	B1
3501	A1	7504	C2
3502	A1	7505	C2
3503	C1	7507	B2
3504	A1	7508	C2
3505	B2	9501	C1
3506	C1	9502	C2
3507	A1	9503	B2
3508	A1	9506	B1
3509	A1	9507	B2
3510	C2	9508	C2
3511	C1	9512	C1
3512	A2	9514	C2
3515	C2	9515	C2
3516	C2	9523	C2
3517	B2	9530	B1
3518	B2	9531	A1
3519	C1	9532	B1
3520	C1	9533	B1
3521	C1		
3522	B2		
3523	B2		
3524	C1		
3525	B1		
3526	A1		
3527	B2		
3528	B2		
3529	C2		
3530	B2		
3531	B2		
3532	C2		
3533	A2		
3538	A2		
3539	B1		
3540	A2		
3541	B1		
3542	A2		
3543	A2		
3544	A2		
3545	A1		
3546	C1		

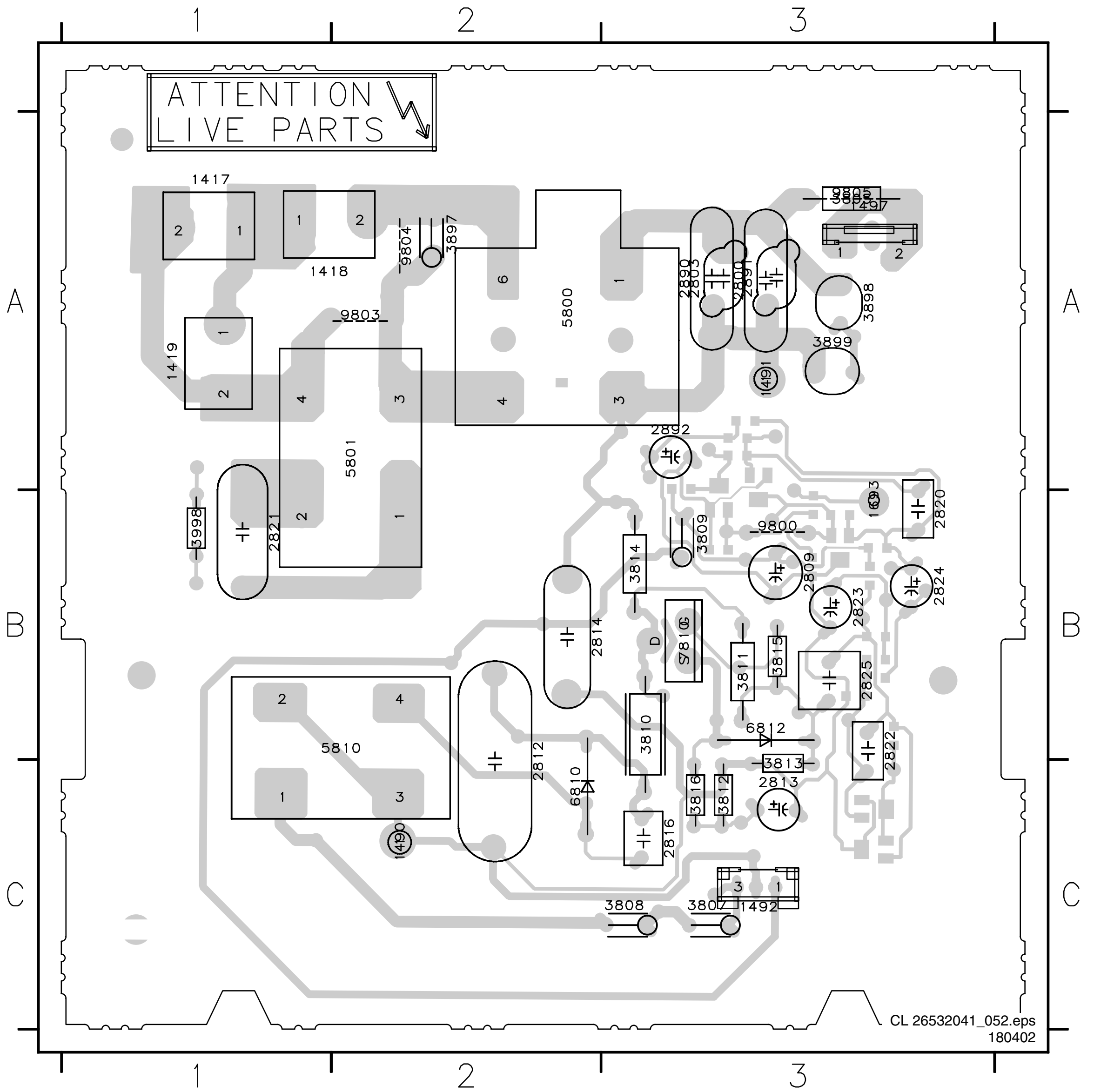
VDAF Panel + 2nd Orders


I
VDAF +
2ND ORDERS
-VERTICAL DAF-
-HORIZONTAL DAF-
-2ND ORDER S-
11V DC
FROM :
EMG 0392 A3
EMG STAR 1492 A3
FROM :
EMG 0393 A4
EMG STAR 1693 A4
TO DEFLECTION COIL
FROM :
EMG 0317 A3
EMG STAR 1417 A3
TO 0318 G
DC-SHIFT
TO dynamic focus input of LOT
DAF OUTPUT
DAF GND
VDAF SIGNAL
TO 1491 A3
V_Parabool
I1
I2
I3
7810 STP3NB80
7818 BC847B
7820 BC847B
7821 BC857B
7822 BC847B
7823 BC857B
6810 BYD33V
6812 BZX79-C22
5800 S21975
5801 CU15
5810 CU15
3809 10R
3808 22R
3807 15R
2816 RES 220p
2820 100n
2822 100n
2809 100u
3898 V 2322592
3899 V 2322592
3805 4M7
9805
9800
9803
9804
3897 1R
2800 330p
2803 RES 330p
2890 270p
2891 RES 330p
2821 68n
3998 100R
CL 26532041_036.eps
170402

1417	E1
1418	D1
1419	F1
1490	C8
1491	E9
1492	A9
1497	D9
1693	C1
2800	E4
2803	E4
2809	A5
2812	A7
2813	C7
2814	B8
2816	A7
2818	C1
2820	A3
2821	F2
2822	A5
2823	B4
2824	C4
2825	B5
2890	E5
2891	E5
2892	B3
3805	D6
3807	A8
3808	A8
3809	A6
3810	A7
3811	B6
3812	C7
3813	C6
3814	B7
3815	B6
3816	C7
3818	C1
3819	B2
3820	C2
3821	A3
3822	A3
3823	A3
3824	B3
3826	C4
3827	C4
3828	C1
3830	B4
3831	B5
3832	A5
3833	C5
3897	E2
3898	D5
3899	E5
3998	C9
5800	E3
5801	F2
5810	A8
6810	A7
6812	C6
7810	B7
7818	C2
7820	C3
7821	C3
7822	C5
7823	C5
9800	D2
9803	F2
9804	E2
9805	D6

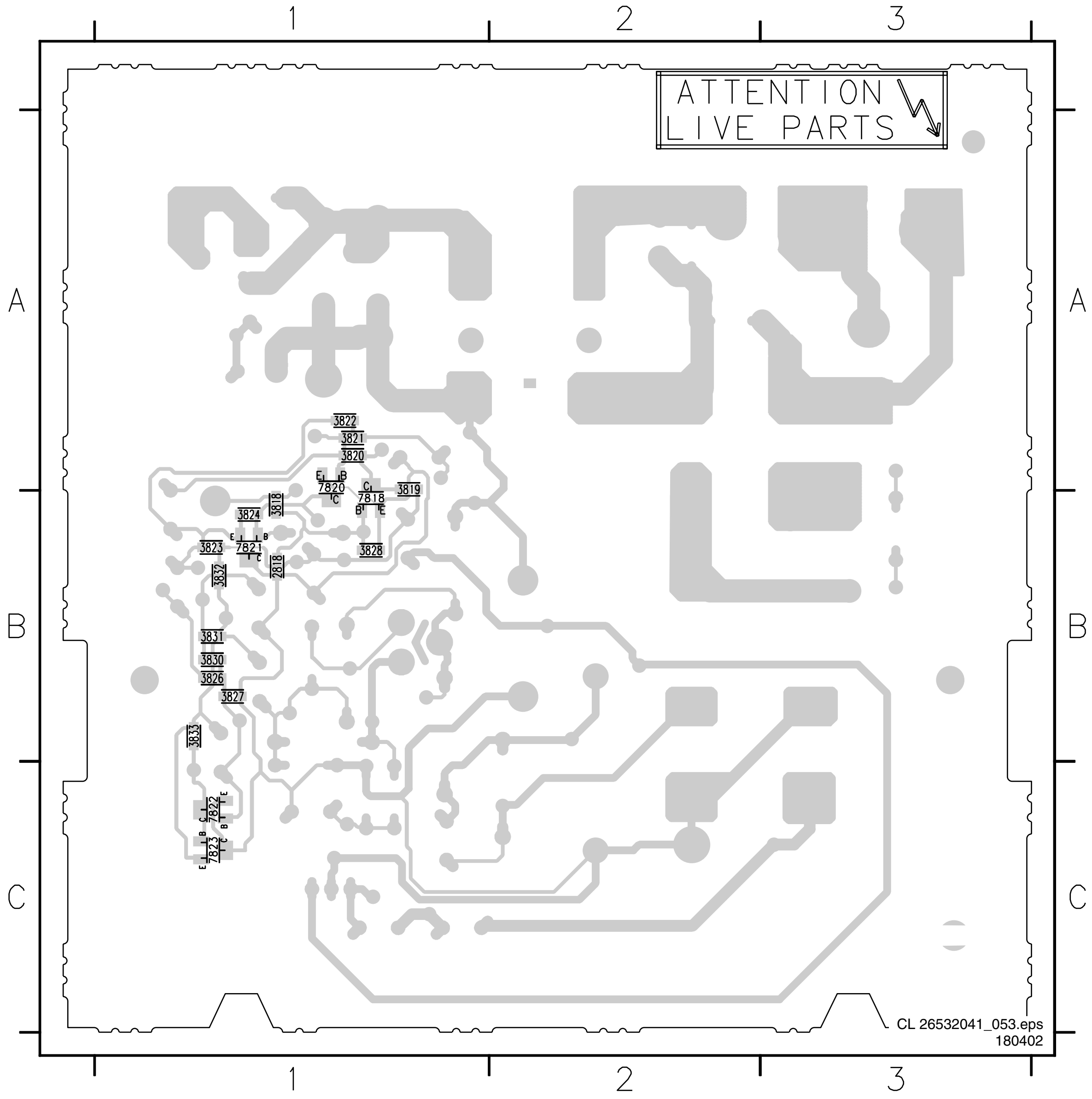
[I] VDAF+2ND ORDER S					
Item	29RF	28RF/32RF	34RF/38RF	36RF	Description
1492	X		X	X	3p
1693	X		X	X	1p
2800	X				330pF
2800		X	X		470pF
2800				X	390pF
2809	X		X	X	100 F
2812	X		X	X	10nF
2813	X		X	X	10 F
2814	X		X	X	1nF
2821	X	X			68nF
2822	X		X	X	4nF
2824	X		X	X	10 F
2825	X		X	X	1 F
2890	X				270pF
2890		X			220pF
2890			X		470pF
2890				X	390pF
3807	X		X	X	15R
3808	X		X	X	15R
3809	X		X	X	10R
3810	X		X	X	470kR
3811	X		X	X	4.7MR
3812	X		X	X	27kR
3813	X		X	X	470kR
3814	X		X	X	100kR
3815	X		X	X	1kR
3816	X		X		4.7kR
3816				X	2.2kR
3818	X		X	X	33kR
3820	X		X	X	Jumper
3821	X		X	X	Jumper
3822	X		X	X	Jumper
3823	X		X	X	1.5kR
3824	X		X	X	33kR
3826	X		X	X	3.3kR
3827	X		X	X	5.6kR
3828	X		X	X	100kR
3830	X		X	X	47kR
3831	X		X	X	4.7kR
3832	X		X	X	1.8kR
3833	X		X	X	4.7kR
5801	X	X			Transformer
5810	X		X	X	Bridge coil
6810	X		X	X	BYD33V
6812	X		X	X	BZX79-C22
7810	X		X	X	STP3NB80FP
7818	X		X	X	BC847B
7822	X		X	X	BC847B
7823	X		X	X	BC857B
9800	X		X	X	Wire
9803			X	X	Wire

Layout VDAF Panel (Top Side)


1
2
3
A
B
C
ATTENTION
LIVE PARTS
1417
1418
1419
9803
9804
3897
5800
5801
2890
2803
2800
2891
9805
3805
1497
3898
3899
1491
2892
1693
2820
3809
9800
2809
2823
2824
3998
2821
2814
3814
7810
3811
3815
2825
5810
2812
6810
3810
6812
3813
2822
3816
3812
2813
2816
1490
3808
3807
1492
CL 26532041_052.eps
180402

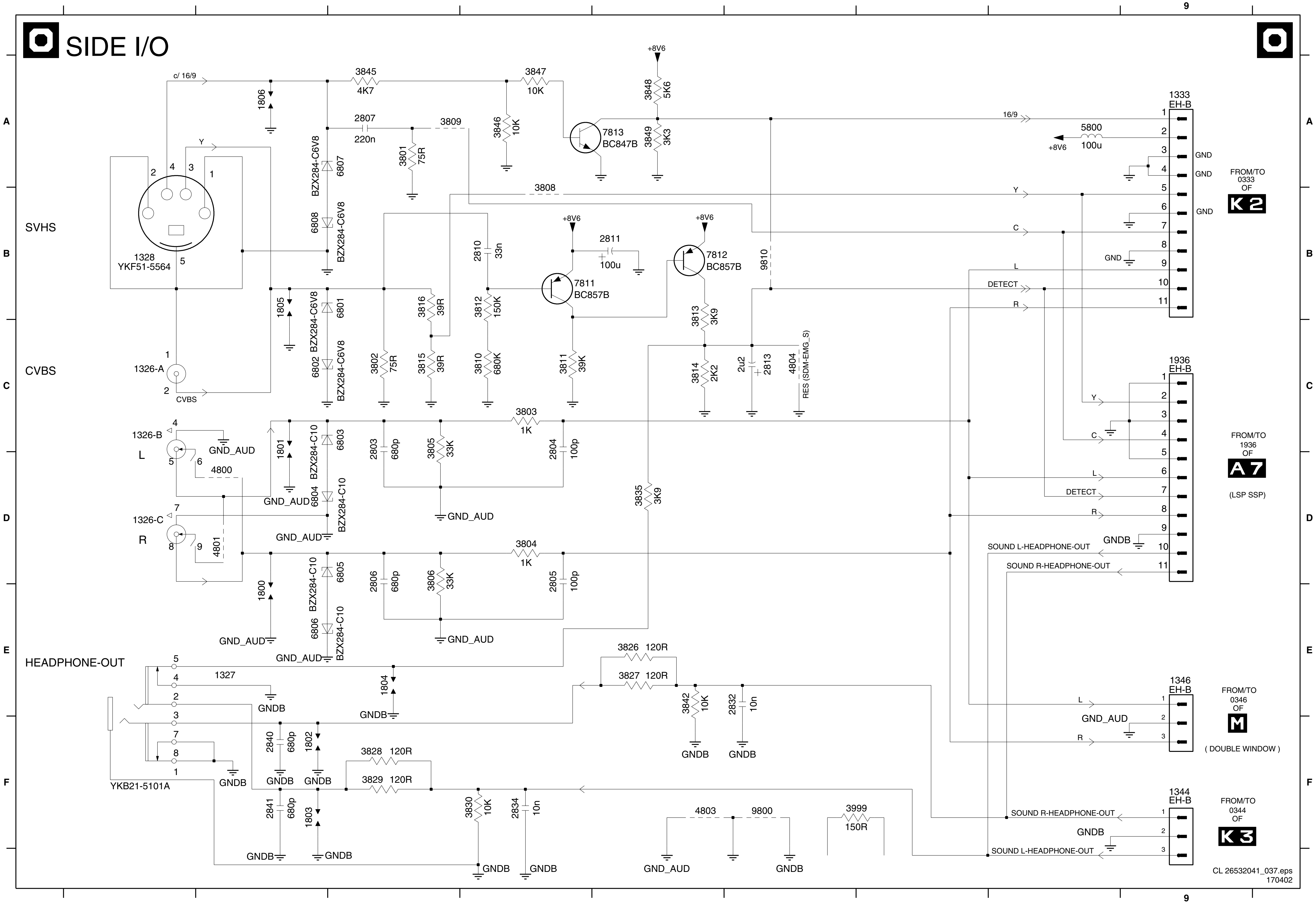
1417	A1
1418	A1
1419	A1
1490	C2
1491	A3
1492	C3
1497	A3
1693	B3
2800	A3
2803	A3
2809	B3
2812	C2
2813	C3
2814	B2
2816	C3
2820	B3
2821	B1
2822	B3
2823	B3
2824	B3
2825	B3
2890	A3
2891	A3
2892	A3
3805	A3
3807	C3
3808	C3
3809	B3
3810	B3
3811	B3
3812	C3
3813	C3
3814	B3
3815	B3
3816	C3
3897	A2
3898	A3
3899	A3
3998	B1
5800	A2
5801	A1
5810	B2
6810	C2
6812	B3
7810	B3
9800	B3
9803	A2
9804	A2
9805	A3

Layout VDAF Panel (Bottom Side)


1
2
3
A
B
C
ATTENTION
LIVE PARTS
3822
3821
3820
7820
7818
3819
3818
3824
3823
7821
3832
2818
3828
3831
3830
3826
3827
3833
7822
7823
CL 26532041_053.eps
180402

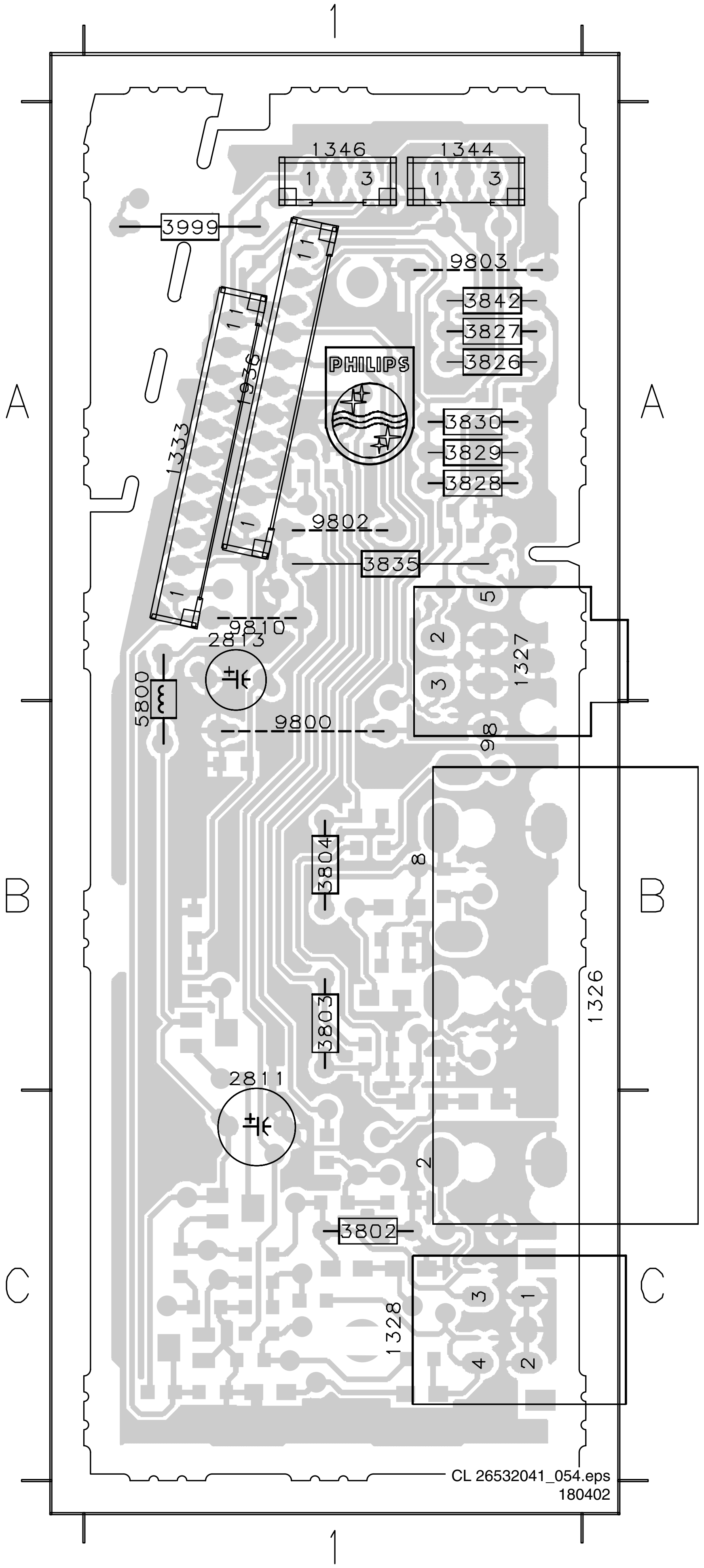
2818	B1
3818	B1
3819	A1
3820	A1
3821	A1
3822	A1
3823	B1
3824	B1
3826	B1
3827	B1
3828	B1
3830	B1
3831	B1
3832	B1
3833	B1
7818	B1
7820	A1
7821	B1
7822	C1
7823	C1

Side I/O Panel


SIDE I/O
SVHS
1328
YKF51-5564
CVBS
1326-A
1326-B
L
1326-C
R
GND_AUD
HEADPHONE-OUT
1327
YKB21-5101A
GNDB
3845 4K7
3847 10K
3846 10K
+8V6
3848 5K6
3849 3K3
7813 BC847B
2807 220n
3809
3801 75R
3808
BZX284-C6V8
6807
6808
1806
1805
6801
6802
3802 75R
3816 39R
3815 39R
2810 33n
3812 150K
3810 680K
7811 BC857B
2811 100u
3811 39K
7812 BC857B
3813 3K9
3814 2K2
2813 2u2
4804 RES (SDM-EMG_S)
9810
3835 3K9
3803 1K
3804 1K
2803 680p
3805 33K
2804 100p
2806 680p
3806 33K
2805 100p
BZX284-C10
6803
6804
6805
6806
1801
1800
4800
4801
1804
3826 120R
3827 120R
3842 10K
2832 10n
2840 680p
1802
2841 680p
1803
3828 120R
3829 120R
3830 10K
2834 10n
4803
9800
3999 150R
5800 100u
c/ 16/9
16/9
Y
C
L
DETECT
R
CVBS
GND
1333 EH-B
FROM/TO 0333 OF
K2
1936 EH-B
FROM/TO 1936 OF
A7
(LSP SSP)
GNDB
SOUND L-HEADPHONE-OUT
SOUND R-HEADPHONE-OUT
1346 EH-B
FROM/TO 0346 OF
M
(DOUBLE WINDOW)
1344 EH-B
FROM/TO 0344 OF
K3
A
B
C
D
E
F
9
CL 26532041_037.eps
170402

1326-A	C1
1326-B	C1
1326-C	D1
1327	E2
1328	B1
1333	A9
1344	F9
1346	E9
1800	E2
1801	C2
1802	F2
1803	F2
1804	E3
1805	B2
1806	A2
1936	C9
2803	C3
2804	C4
2805	D4
2806	D3
2807	A3
2810	B4
2811	B5
2813	C6
2832	E6
2834	F4
2840	F2
2841	F2
3801	A3
3802	C3
3803	C4
3804	D4
3805	C3
3806	D3
3808	B4
3809	A3
3810	C4
3811	C4
3812	B4
3813	B5
3814	C5
3815	C3
3816	B3
3826	E5
3827	E5
3828	F3
3829	F3
3830	F4
3835	D5
3842	E5
3845	A3
3846	A4
3847	A4
3848	A5
3849	A5
3999	F7
4800	D2
4801	D2
4803	F5
4804	C6
5800	A8
6801	B3
6802	C2
6803	C3
6804	D2
6805	D3
6806	E2
6807	A3
6808	B2
7811	B4
7812	B5
7813	A5
9800	F6
9810	B6

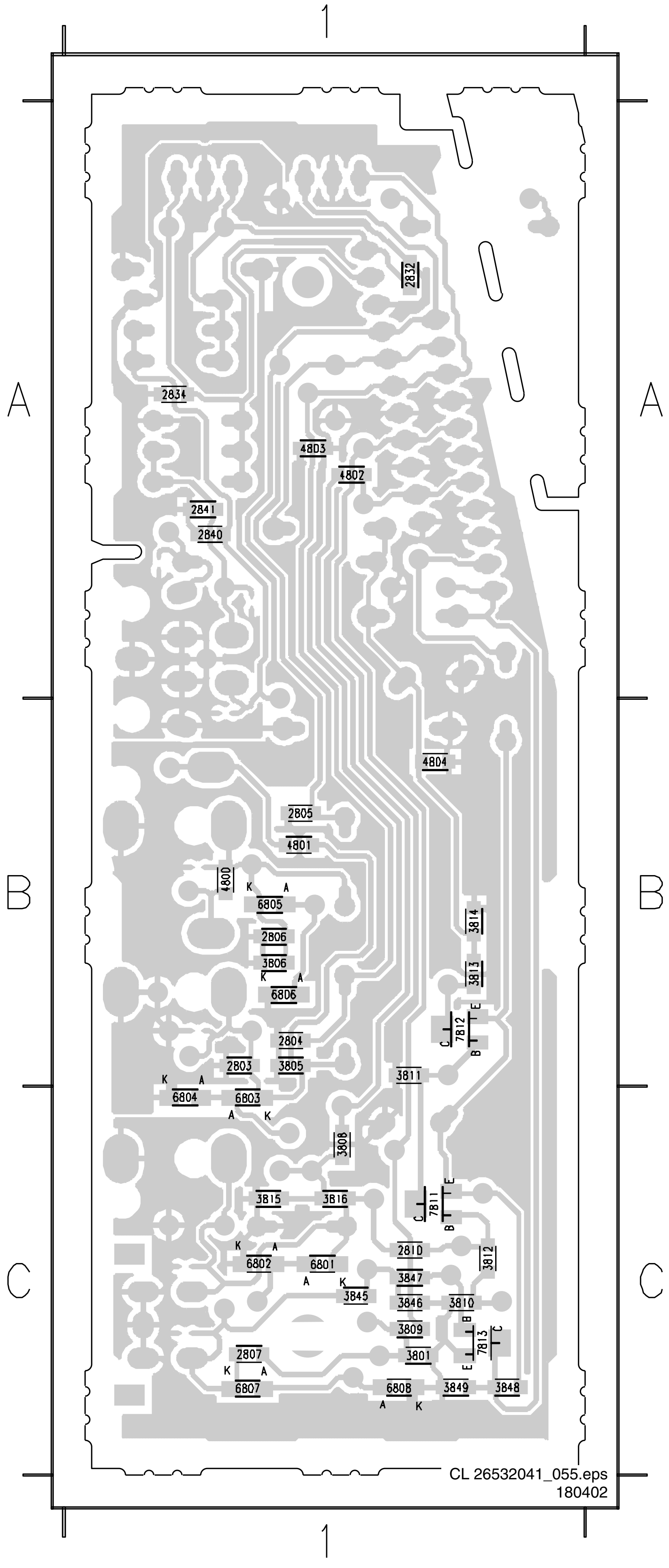
Layout Side I/O Panel (Top Side)


1
A
B
C
1346
1344
3999
1936
1333
9803
3842
3827
3826
PHILIPS
3830
3829
3828
9802
3835
9810
2813
5800
1327
9800
3804
3803
1326
2811
3802
1328
1

CL 26532041_054.eps
180402

1326	B1
1327	A1
1328	C1
1333	A1
1344	A1
1346	A1
1936	A1
2811	B1
2813	A1
3802	C1
3803	B1
3804	B1
3826	A1
3827	A1
3828	A1
3829	A1
3830	A1
3835	A1
3842	A1
3999	A1
5800	A1
9800	B1
9802	A1
9803	A1
9810	A1

Layout Side I/O Panel (Bottom Side)

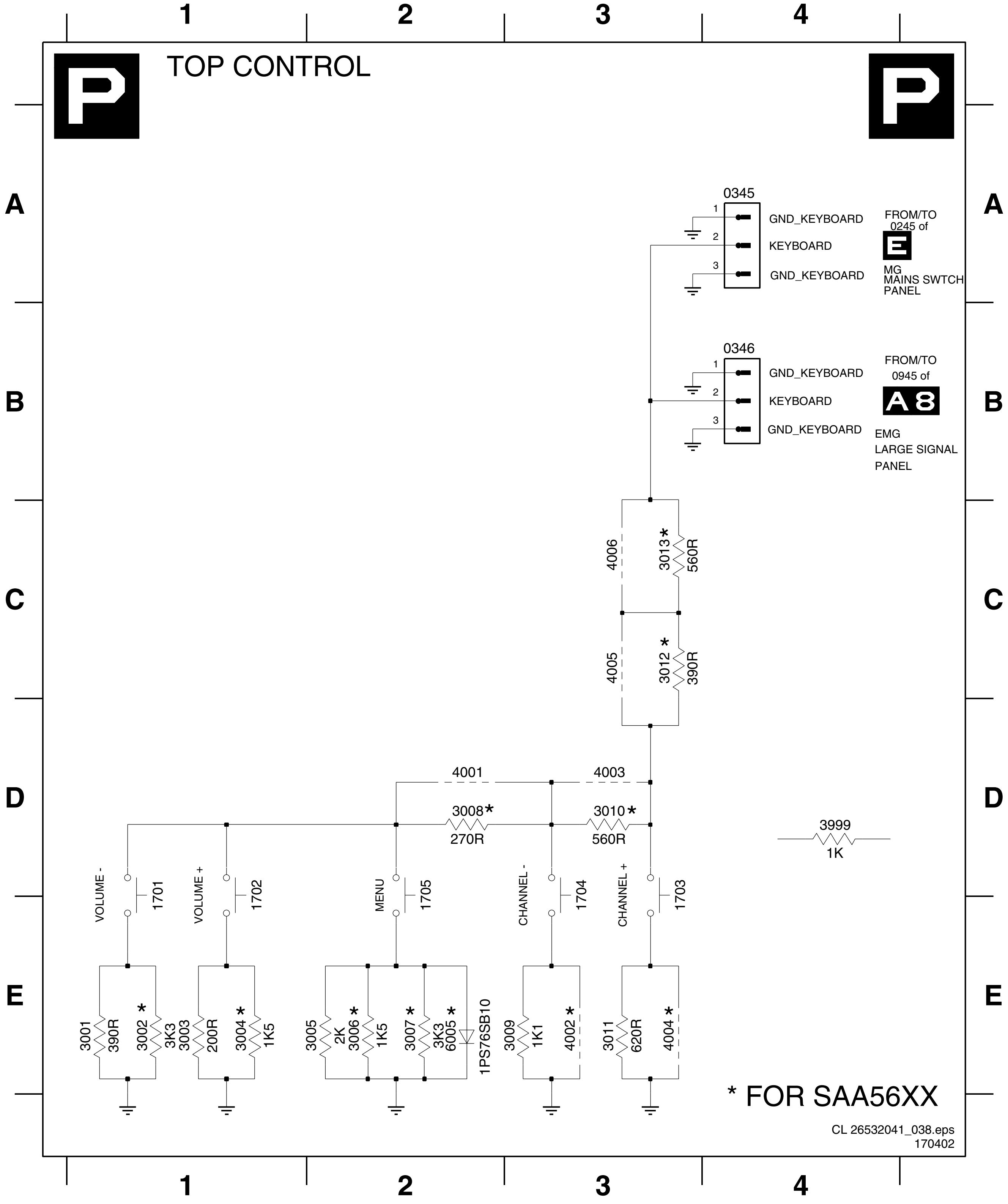

1
A
B
C
2832
2834
4803
4802
2841
2840
4804
2805
4801
4800
6805
2806
3806
6806
3814
3813
7812
2804
2803
3805
3811
6804
6803
3808
3815
3816
7811
2810
3812
6802
6801
3847
3845
3846
3810
3809
7813
3801
2807
6807
6808
3849
3848
1

CL 26532041_055.eps
180402

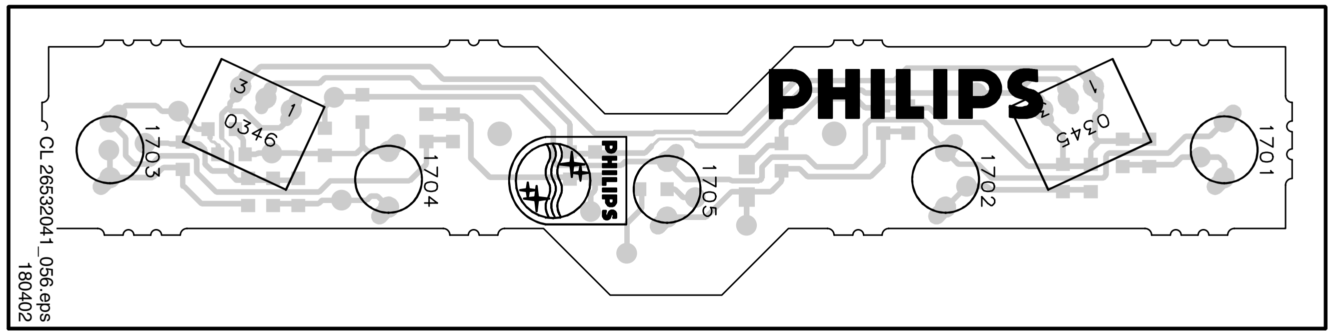
2803	B1
2804	B1
2805	B1
2806	B1
2807	C1
2810	C1
2832	A1
2834	A1
2840	A1
2841	A1
3801	C1
3805	B1
3806	B1
3808	C1
3809	C1
3810	C1
3811	B1
3812	C1
3813	B1
3814	B1
3815	C1
3816	C1
3845	C1
3846	C1
3847	C1
3848	C1
3849	C1
4800	B1
4801	B1
4802	A1
4803	A1
4804	B1
6801	C1
6802	C1
6803	B1
6804	C1
6805	B1
6806	B1
6807	C1
6808	C1
7811	C1
7812	B1
7813	C1

Top Control Panel

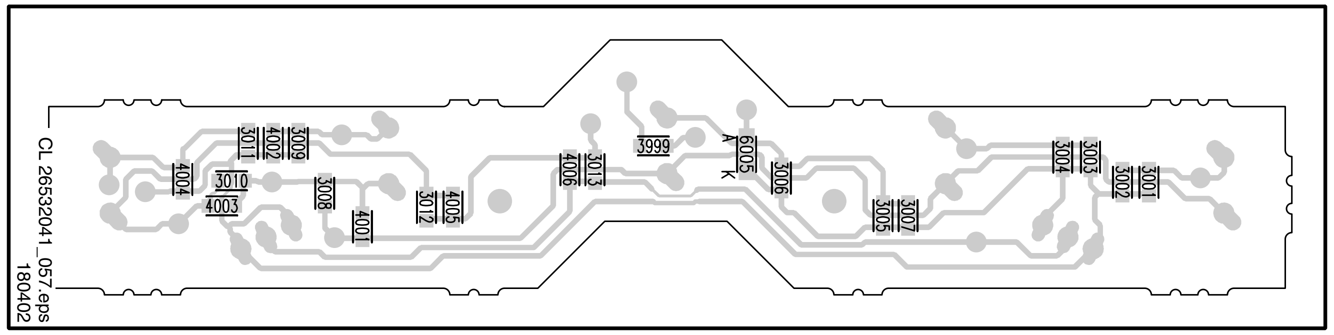
0345 A4	1703 D3	3002 E1	3006 E2	3010 D3	3999 D4	4004 E3
0346 B4	1704 D3	3003 E1	3007 E2	3011 E3	4001 D2	4005 C3
1701 D1	1705 D2	3004 E1	3008 D2	3012 C3	4002 E3	4006 C3
1702 D1	3001 E1	3005 E2	3009 E3	3013 C3	4003 D3	6005 E2


1
2
3
4
A
B
C
D
E
P
TOP CONTROL
P
0345
1
2
3
GND_KEYBOARD
KEYBOARD
GND_KEYBOARD
FROM/TO
0245 of
E
MG
MAINS SWTCH
PANEL
0346
1
2
3
GND_KEYBOARD
KEYBOARD
GND_KEYBOARD
FROM/TO
0945 of
A8
EMG
LARGE SIGNAL
PANEL
4006
3013 *
560R
4005
3012 *
390R
4001
4003
3008*
270R
3010*
560R
3999
1K
VOLUME -
1701
VOLUME +
1702
MENU
1705
CHANNEL -
1704
CHANNEL +
1703
3001
390R
3002 *
3K3
3003
200R
3004 *
1K5
3005
2K
3006 *
1K5
3007 *
3K3
6005 *
1PS76SB10
3009
1K1
4002 *
3011
620R
4004 *
* FOR SAA56XX
CL 26532041_038.eps
170402

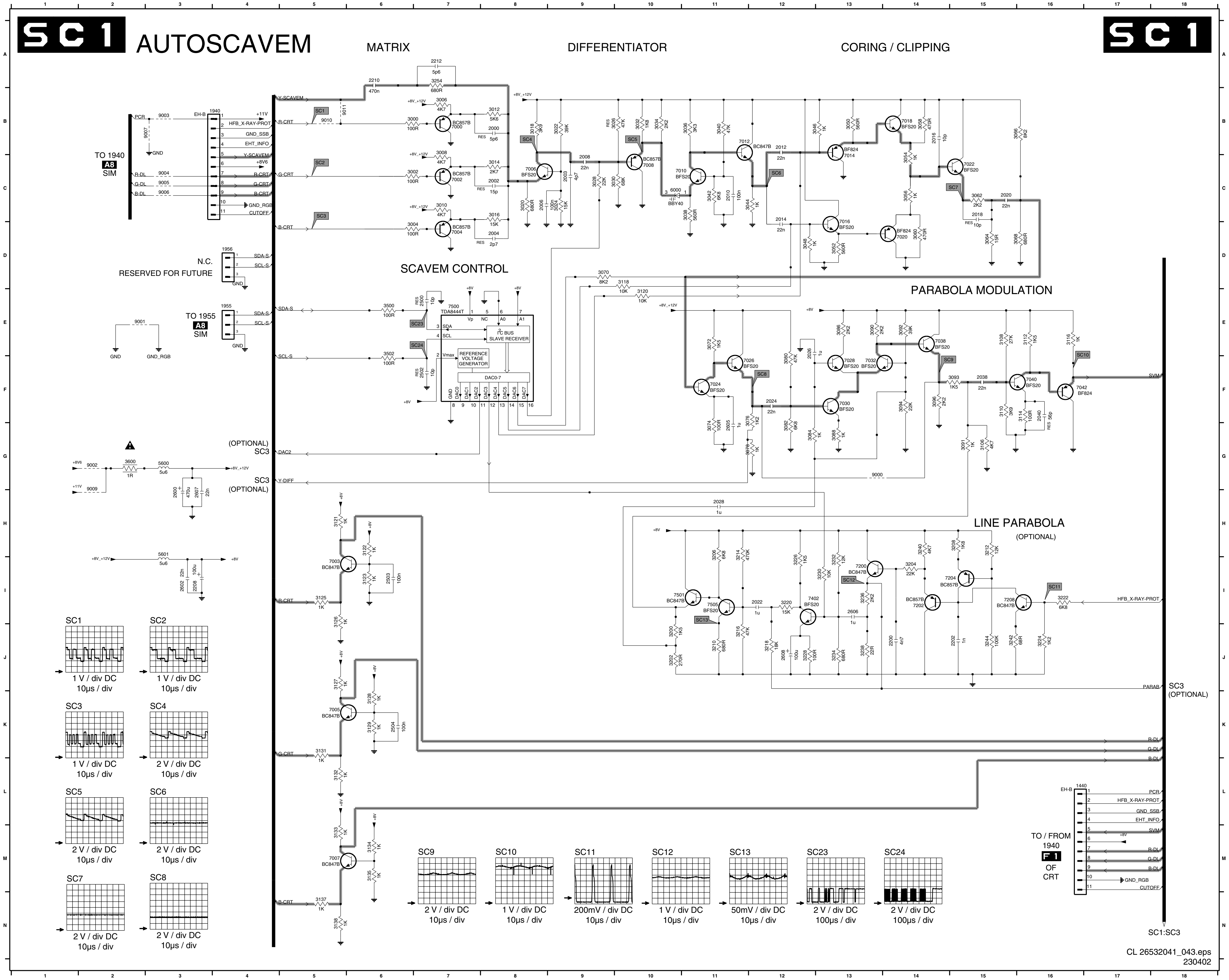
Top Control Panel (Top Side)


PHILIPS
PHILIPS
0346
3
1
0345
1703
1704
1705
1702
1701
CL 26532041_056.eps
180402

Top Control Panel (Bottom Side)

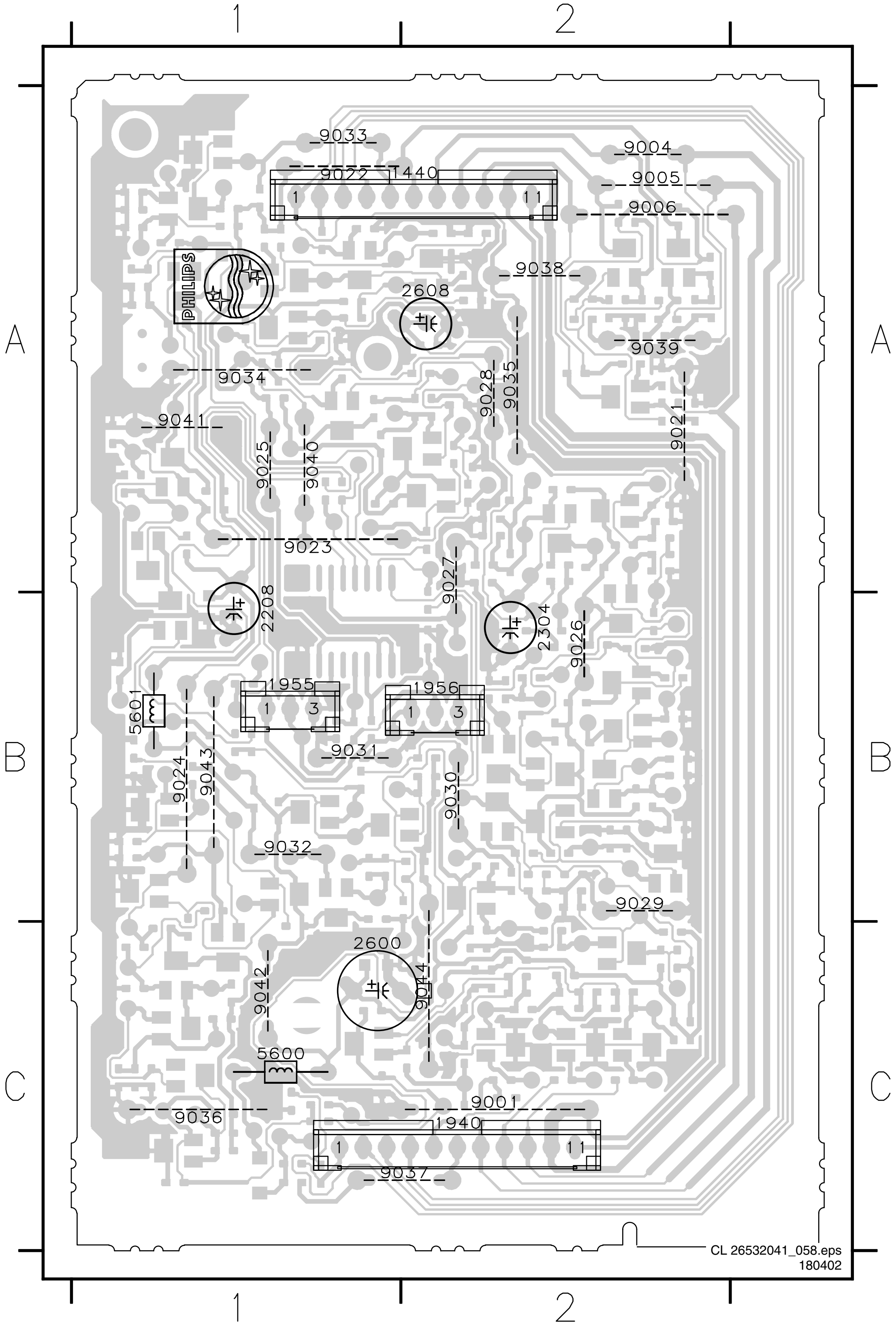

3011
4002
3009
4004
3010
4003
3008
4001
3012
4005
4006
3013
3999
A
K
6005
3006
3005
3007
3004
3003
3002
3001
CL 26532041_057.eps
180402

Auto SCAVEM Panel


SC1
AUTOSCAVEM
MATRIX
DIFFERENTIATOR
CORING / CLIPPING
SCAVEM CONTROL
PARABOLA MODULATION
LINE PARABOLA
(OPTIONAL)
TO 1940
A8
SIM
N.C.
RESERVED FOR FUTURE
TO 1955
A8
SIM
(OPTIONAL)
SC3
SC3
(OPTIONAL)
7500
TDA8444T
I²C BUS
SLAVE RECEIVER
REFERENCE
VOLTAGE
GENERATOR
DAC0-7
TO / FROM
1940
F1
OF
CRT
SC3
(OPTIONAL)
SC1:SC3
SC1
1 V / div DC
10µs / div
SC2
1 V / div DC
10µs / div
SC3
1 V / div DC
10µs / div
SC4
2 V / div DC
10µs / div
SC5
2 V / div DC
10µs / div
SC6
2 V / div DC
10µs / div
SC7
2 V / div DC
10µs / div
SC8
2 V / div DC
10µs / div
SC9
2 V / div DC
10µs / div
SC10
1 V / div DC
10µs / div
SC11
200mV / div DC
10µs / div
SC12
1 V / div DC
10µs / div
SC13
50mV / div DC
10µs / div
SC23
2 V / div DC
100µs / div
SC24
2 V / div DC
100µs / div
CL 26532041_043.eps
230402

1440	L17
1940	B4
1955	E4
1956	D4
2000	B8
2002	C8
2003	C9
2004	D8
2006	C8
2008	C9
2010	C11
2012	B12
2014	C12
2016	B14
2018	C15
2020	C15
2022	I12
2024	F12
2026	E12
2028	H11
2038	F15
2040	F16
2200	J14
2202	J15
2208	I3
2210	A6
2212	A7
2500	E7
2502	F7
2503	I6
2504	K6
2600	H3
2602	I3
2605	G11
2606	I13
2607	H3
2608	J12
3000	B6
3002	C6
3004	D6
3006	B7
3008	B7
3010	C7
3012	B8
3014	C8
3016	C8
3018	B8
3020	C8
3022	B9
3024	C9
3026	B10
3028	C9
3030	C10
3032	B10
3034	B10
3036	B11
3038	C11
3040	B11
3042	C11
3044	C12
3046	B13
3048	D12
3050	B13
3052	D13
3054	C14
3056	C14
3058	B14
3060	D14
3062	C15
3064	D15
3066	B16
3068	D16
3070	D9
3072	E11
3074	G11
3076	F12
3078	G12
3080	F12
3082	G12
3084	G12
3086	E13
3088	G13
3090	E13
3091	G15
3092	E14
3093	F15
3094	F14
3096	F14
3106	G15
3108	E15
3110	F15
3112	E16
3114	F16
3116	E16
3118	D10
3120	E10
3121	H5
3122	H6
3123	I6
3124	I5
3125	I5
3126	I5
3127	J5
3128	K6
3129	K6
3130	K5
3131	K5
3132	L5
3133	M5
3134	M6
3135	M6
3136	M5
3137	N5
3138	N5
3200	J10
3202	J10
3204	I14
3206	H11
3208	H15
3210	J11
3212	H15
3214	H11
3216	J11
3218	J12
3220	I12
3222	I16
3224	J16
3226	I12
3228	J12
3230	I13
3232	I13
3234	J13
3236	I13
3238	J13
3240	H14
3242	J15
3244	J15
3254	A7
3500	E6
3502	E6
3600	G2
3999	A3
5600	G3
5601	H3
6000	C10
7000	B7
7002	C7
7003	I5
7004	D7
7005	K5
7006	C8
7007	M5
7008	C10
7010	C10
7012	B11
7014	B13
7016	D13
7018	B14
7020	D14
7022	C15
7024	F11
7026	F11
7028	F13
7030	F13
7032	F13
7038	E14
7040	F16
7042	F16
7200	I13
7202	I14
7204	I15
7208	I15
7402	I13
7500	E7
7501	I11
7505	I11
9000	G13
9001	E2
9002	G2
9003	B3
9004	C3
9005	C3
9006	C3
9007	B3
9009	H2
9010	B5
9011	B5

Layout Auto SCAVEM Panel (Top SIde)

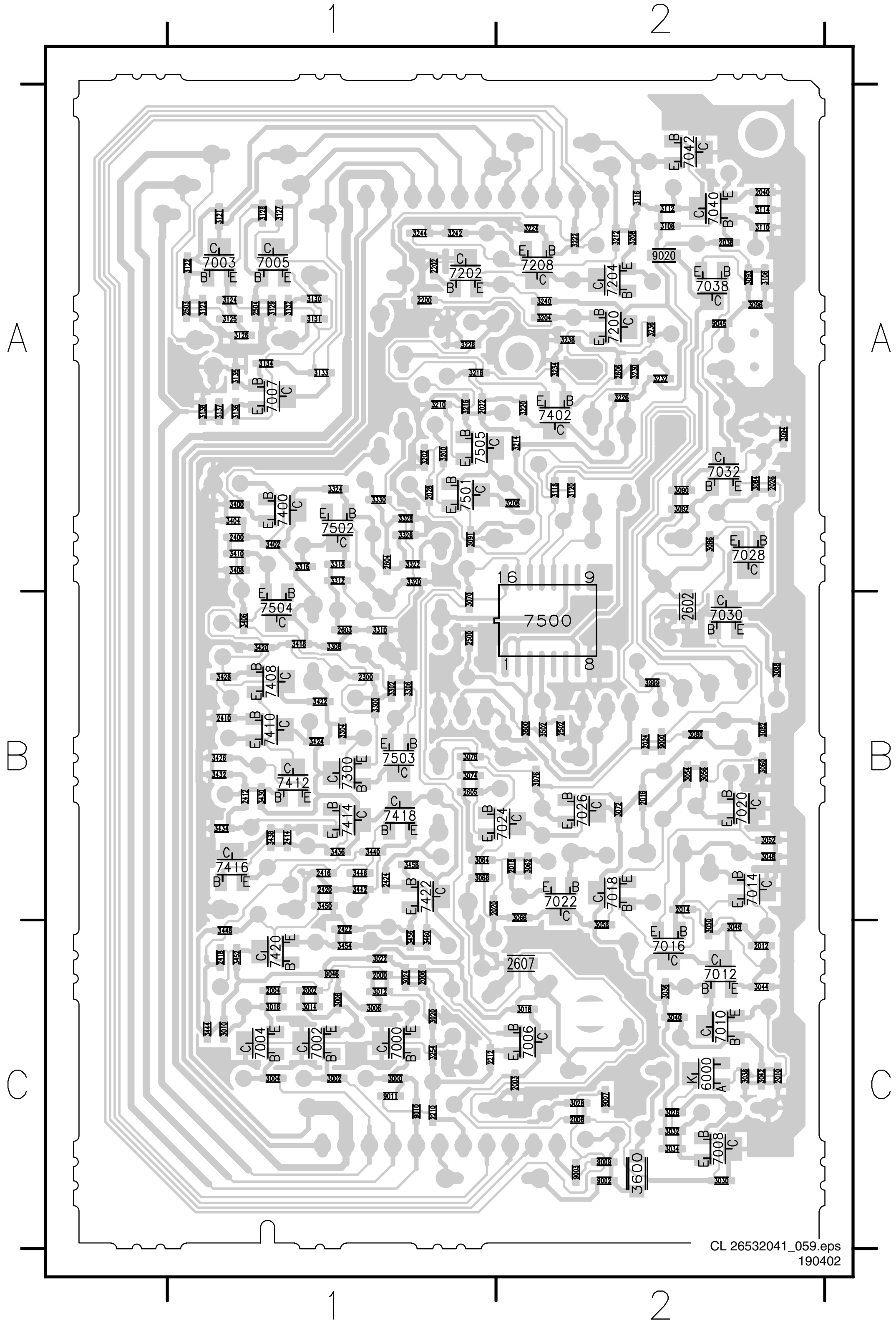

1
2
A
B
C
1440
9033
9022
9004
9005
9006
PHILIPS
2608
9038
9039
9034
9028
9035
9041
9025
9040
9021
9023
9027
2208
2304
9026
5601
1955
1956
9024
9043
9031
9030
9032
9029
2600
9042
9044
5600
9001
1940
9036
9037

CL 26532041_058.eps
180402

1440	A2
1940	C2
1955	B1
1956	B2
2208	B1
2304	B2
2600	C1
2608	A2
5600	C1
5601	B1
9001	C2
9004	A2
9005	A2
9006	A2
9021	A2
9022	A1
9023	A1
9024	B1
9025	A1
9026	B2
9027	A2
9028	A2
9029	B2
9030	B2
9031	B1
9032	B1
9033	A1
9034	A1
9035	A2
9036	C1
9037	C1
9038	A2
9039	A2
9040	A1
9041	A1
9042	C1
9043	B1
9044	C2

Layout Auto SCAVEM Panel (Bottom SIde)

2000	C1
2002	C1
2003	C2
2004	C1
2006	C1
2008	C2
2010	C2
2012	C2
2014	B2
2016	B2
2018	B2
2020	B1
2022	A1
2024	B2
2026	A2
2028	A1
2038	A2
2040	A2
2200	A1
2202	A1
2210	C1
2212	C1
2300	B1
2400	A1
2410	B1
2412	B1
2414	B1
2416	B1
2418	C1
2420	B1
2422	C1
2424	B1
2500	B1
2502	B2
2503	A1
2504	A1
2602	B2
2603	B1
2604	A1
2605	B1
2606	A2
2607	C2
3000	C1
3002	C1
3004	C1
3006	C1
3008	C1
3010	C1
3012	C1
3014	C1
3016	C1
3018	C2
3020	C1
3022	C1
3024	C1
3026	C2
3028	C2
3030	C2
3032	C2
3034	C2
3036	C2
3038	C2
3040	C2


1
2
A
B
C
7042
7040
9020
7003
7005
7202
7208
7204
7038
7200
7007
7402
7505
7032
7501
7400
7502
7028
16
9
7500
1
8
2602
7030
7504
7408
7410
7503
7412
7300
7418
7414
7024
7026
7020
7416
7422
7022
7018
7014
7016
7420
2607
7012
7004
7002
7000
7006
7010
6000
7008
3600

CL 26532041_059.eps
190402

3042	C2
3044	C2
3046	C2
3048	B2
3050	C2
3052	B2
3054	B2
3056	B2
3058	C2
3060	B2
3062	B2
3064	B1
3066	B2
3068	B1
3070	B1
3072	B2
3074	B1
3076	B2
3078	B1
3080	B2
3082	B2
3084	A2
3086	A2
3088	B2
3090	A2
3091	A1
3092	A2
3093	A2
3094	A2
3096	A2
3106	A2
3108	A2
3110	A2
3112	A2
3114	A2
3116	A2
3118	A2
3120	A2
3121	A1
3122	A1
3123	A1
3124	A1
3125	A1
3126	A1
3127	A1
3128	A1
3129	A1
3130	A1
3131	A1
3132	A1
3133	A1
3134	A1
3135	A1
3136	A1
3137	A1
3138	A1
3200	A1
3202	A1
3204	A2
3206	A2
3208	A2
3210	A1
3212	A2
3214	A2
3216	A1
3218	A1
3220	A2
3222	A2
3224	A2
3226	A2
3228	A1
3230	A2
3232	A2
3234	A2
3236	A2
3238	A2
3240	A2
3242	A1
3244	A1
3254	C1
3300	B1
3302	B1
3304	B1
3306	B1
3308	B1
3310	B1
3312	A1
3316	A1
3318	A1
3320	A1
3322	A1
3324	A1
3326	A1
3328	A1
3330	A1
3400	A1
3402	A1
3404	A1
3406	B1
3408	A1
3410	A1
3418	B1
3420	B1
3422	B1
3424	B1
3426	B1
3428	B1
3430	B1
3432	B1
3434	B1
3436	B1
3438	B1
3440	B1
3442	B1
3444	C1
3446	B1
3448	C1
3450	B1
3452	C1
3454	C1
3456	C1
3458	B1
3460	C1
3500	B2
3502	B2
3600	C2
3999	B2
6000	C2
7000	C1
7002	C1
7003	A1
7004	C1
7005	A1
7006	C2
7007	A1
7008	C2
7010	C2
7012	C2
7014	B2
7016	C2
7018	B2
7020	B2
7022	C2
7024	B1
7026	B2
7028	A2
7030	B2
7032	A2
7038	A2
7040	A2
7042	A2
7200	A2
7202	A2
7204	A2
7208	A2
7300	B1
7400	A1
7402	A2
7408	B1
7410	B1
7412	B1
7414	B1
7416	B1
7418	B1
7420	C1
7422	B1
7500	A2
7501	A1
7502	A1
7503	B1
7504	A1
7505	A1
9000	B2
9002	C2
9003	C2
9007	C2
9009	C2
9010	C1
9011	C1
9020	A2
9045	A2
9046	C1

8. Electrical Alignments

Index of this chapter

1. General alignment conditions
2. Hardware alignments
3. Software alignments
4. Option settings

8.1 General Alignment Conditions

8.1.1 Start Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 230 V_{AC}/50 Hz (± 10 %).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 20 to 30 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). **Caution:** never use the cooling fins/plates as ground.
- Test probe: Ri > 10 MΩ, Ci < 20 pF.
- Use an isolated trimmer/screwdriver to perform the alignments.

Perform all electrical adjustments with the following start settings (for all CRTs):

- Set LIGHT SENSOR ‘off’, by setting ACTIVE CONTROL to 'off' with the remote control.
- Set CONTRAST to '75', BRIGHTNESS and COLOUR to ‘40’ (via PICTURE menu).
- Set COLOUR ENHANCEMENT to ‘off’ (via PICTURE menu).
- Set DIGITAL OPTIONS to 'Pixel Plus' (via PICTURE menu), unless otherwise stated (for sets without 'Pixel Plus' (= Eagle), set to 'Natural Motion').
- Set DYNAMIC CONTRAST to ‘off’ (via PICTURE menu).
- Set CATHODE DRIVE at ‘15’ (via SAM - Alignments - General - Drive - Cathode).

8.1.2 Adjustment Sequence

Use the following adjustment sequence:

1. Set the correct TV-set ‘options’ (after storing, re-start the set!).
2. Rough adjustment of ‘Vg2’ and ‘Focus’.
3. Rough adjustment of ‘Geometry’.
4. Allow the set to warm up.
5. Accurate adjustment of ‘Vg2’ and ‘Focus’.
6. Accurate adjustment of ‘Geometry’.
7. Software alignments (cut-off, cathode drive, peak white, white drive, etc).

8.2 Hardware Alignments

Note: The Service Alignment Mode (SAM) is described in chapter 5 of the Service Manual. Menu navigation is done with the 'CURSOR UP, DOWN, LEFT or RIGHT' keys of the remote control (RC) transmitter.

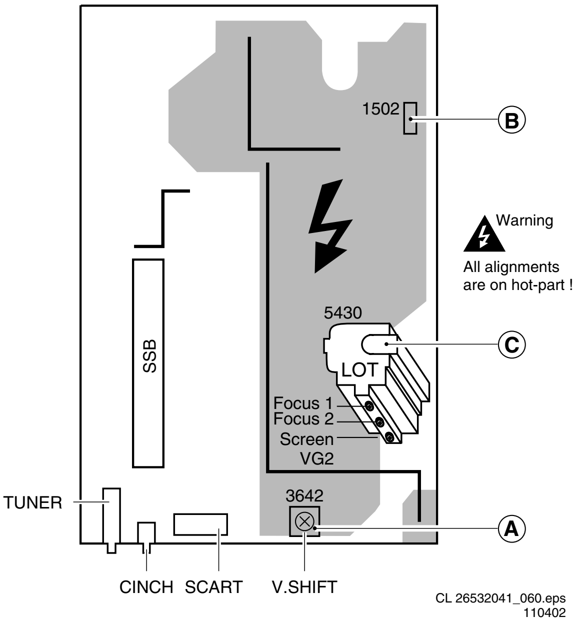


Figure 8-1 Top-view LSP

8.2.1 Vg2 Adjustment

Method 1 (with oscilloscope)

In the frame-blanking period of the R, G, and B signals applied to the CRT, the 'HOP' video processor inserts a measuring pulse with different DC levels. Measure the black level pulse during the vertical flyback at the RGB cathodes of the CRT.

1. Go, via the 'MENU' key, to the normal user menu, select 'PICTURE', and set 'CONTRAST' and 'BRIGHTNESS' to '0'.
2. Activate the SAM.
3. Connect the RF output of a pattern generator to the antenna input. Test pattern is a 'black' picture (blank screen on CRT without any OSD info).
4. Set the channel of the oscilloscope to 20 V/div and the time base to 20 us/div. Use external triggering on the vertical pulse (**caution**: use a trigger point at the '**cold**' side!).
5. Ground the scope at the CRT panel ('**cold**' side) and connect a 10:1 probe to one of the cathodes of the picture tube socket (see diagram F).
6. Measure the cut-off pulse during first full line after the frame blanking. You will see two pulses, one being the cut-off pulse and the other being the white drive pulse. Choose the one with the lowest value; this is the cut-off pulse.
7. Select the cathode with the highest V_{DC} value for the alignment. Adjust the V_{CUTOFF} of this gun with the SCREEN (lower) potentiometer on the LOT to the correct DC-value (tolerance is +/- 3 V_{DC}):
   - 28": 160 V.
   - 29": 160 V.
   - 32": 160 V.
   - 36": 170 V.
8. Restore 'CONTRAST' and 'BRIGHTNESS' to normal (CONTRAST = 75 and BRIGHTNESS = 40).

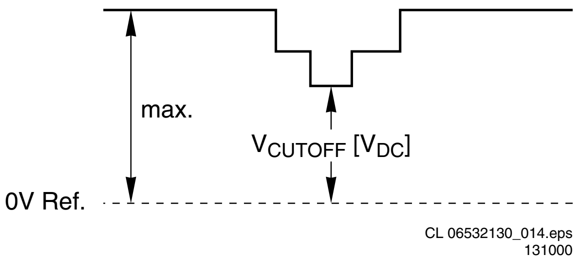


Figure 8-2 Waveform Vg2 alignment

Method 2 (without oscilloscope)

Note: Use this 'software driven' alignment **only** in cases when there is no oscilloscope available, because of the high spread and tolerances.

1. Activate the SAM with the RC-code '062596' directly followed by 'OSD [i+]'.
2. Select 'Alignments'.
3. Select the 'General' sub-menu.
4. Set 'Vg2 Test Pattern' to 'On'
5. You will now get OSD feedback during Vg2 alignment.
6. First, turn the Vg2 potmeter on the LOT to the left. OSD feedback will show '**Out/High**'.
7. Turn the Vg2 potmeter slowly clockwise until the OSD toggles between '**In/High** and **In/ Low**'. This is the correct value.

8.2.2 Focus alignment

Notes:

- Tune the set to a 'circle with crosshatch' test pattern (use an external video pattern generator).
- Choose picture mode 'NATURAL' with the 'SMART PICTURE' button on the remote control transmitter.
- ELDOR LOT outline:
  – Focus 1 (F1) = Static alignment (black wire).
  – Focus 2 (F2) = Dynamic alignment (red wire).

Focus method for Philips 32” tube with bleeder gun

1. Start the alignment with the STATIC focus (upper potmeter) turned to the **left** and the DYNAMIC focus (middle potmeter) to the **right**.
2. Adjust the DYNAMIC focus until the horizontal lines at the centre of the screen have minimum width.
3. Adjust the STATIC focus until the vertical lines at the corners of the screen have minimum width.
4. Adjust the DYNAMIC focus until the horizontal lines at the centre of the screen have minimum width.
5. Check overall spot performance and repeat steps 3 and 4 to achieve the best result.

Focus method for all other tubes

1. Start with the STATIC and DYNAMIC focus potentiometers on the LOT at **midway**.
2. Adjust the STATIC focus until the vertical lines at 1/4 from east and west, at the height of the centre line, has minimum width without introducing a visible haze.
3. Adjust the DYNAMIC focus until the horizontal line at the centre of the screen has minimum width without introducing a visible haze.
4. Check overall spot performance and repeat steps 2 and 3 to achieve the best result: a compromise between minimal visible haze at the middle of the screen and sharp lines at the edges of the screen.

8.3 Software Alignments

8.3.1 Introduction

With the software alignments, it is possible to align the Geometry, White Tone, and Tuner IF settings.
Put the set in the SAM (see chapter 5). The SAM menu will now appear on the screen. Select, via '**Alignments**', one of the sub-menus. They are explained below in the sequence of the sub-menus.

Notes:

- All changes to menu items and alignments are stored automatically, except the option codes. They must be stored manually.
- If the Option codes have been changed **and stored**, the set has to be switched 'OFF' and 'ON' using the mains switch to activate the new settings (when switching via Standby, the option code settings are NOT read by the microprocessor).
- If an empty EAROM (permanent memory) is detected, all settings are set to pre-programmed default values.

8.3.2 General

Vg2 Test Pattern

In this sub-menu, you can turn 'On' the OSD feedback for the Vg2 alignment (see chapter 8.2.1).

Adjust Peak White Limiter

Fixed setting: 4.

EHT compensation

Enter value '9' for the 28" and 32", '12' for the 29", or '10' for the 36" picture tubes.

Soft clipper

Fixed setting: Pwl + 0%

Luma gain

Fixed setting: 2.

IF AFC

Supply, via an external video generator (e.g. PM5518), a TV signal with strength of at least 1 mV and a frequency of 475.25 MHz. Use system BG if possible, otherwise match the system of your generator with the received signal in the set.

Alignment procedure:

1. Go to the 'Installation' menu.
2. Select 'Manual installation'.
3. Tune the TV-set to the system and frequency described above via 'Search' - '475' - 'OK'.
4. If the frequency, showed in the line 'Fine tune', is between 475.18 MHz and 475.31 MHz, you do not need to re-adjust the 'IF AFC'.
5. If not, adjust the frequency in the 'Fine tune' line to 475.25 MHz and 'Store' the program (this is very important because this will disable the AFC algorithm).
6. Now go to the SAM and select 'Alignments' - 'General' - 'IF AFC'.
7. During the 'IF AFC'-parameter adjustment, one can see OSD feedback in the top of the screen.
8. This OSD feedback can give 4 kind of messages:

Table 8-1 OSD feedback of AFC alignment

AFC-window	AFC-frequency vs. reference
Out	High
In	High
In	Low
Out	Low

1. The first item ('In' or 'Out') informs you whether you are in or out the AFC-window.
2. The second item ('High' or 'Low') informs you about whether the AFC-frequency is too high or too low.
3. First you must align the 'IF AFC'-parameter such that you come into the AFC-window (= 'In')
4. Then you must look for the point where the 'IF AFC'-parameter changes from 'High' to 'Low'. This level is the value you are looking for.
5. After adjustment, 'Store' the value.
6. Now return to the 'Installation' menu.
7. Select 'Manual Installation' - 'Search' - '475' - 'OK' and 'Store'. This will set the AFC 'on' again.

Service tip: If you do not trust the frequency accuracy of your service generator, connect it to a 'good' TV set and check it with the 'Fine tune'-line.

IF Lprime AFC

Use the same procedure as for the 'IF AFC' alignment, but set the video generator to SECAM L/L' (only necessary for countries that have or can receive this system).

Tuner AGC

1. Set the external pattern generator to a colour bar video signal and connect the RF output to the aerial input. Set the amplitude to 10 mV and set the frequency to 475.25 MHz.
2. Connect a DC multimeter between pin 1 and the shielding of the Tuner (item 1200 on the LSP).
3. Adjust the 'TUNER AGC' value (default value is 25) with the LEFT/RIGHT cursor keys until the voltage at pin 1 of the tuner lies between 3.8 and 2.3 V.
4. 'Store' the alignment.

Blend intensity

Use this alignment when you replace the microcontroller or the HOP. It aligns the level of transparency of the menu-picture blended into the main-picture.
Position the BRIGHTNESS, CONTRAST, and COLOUR setting in the middle position (picture-menu).

1. Apply a signal with a 100 % white video-pattern.
2. Connect an oscilloscope to pin 8 of connector 1298 of the CRT panel and measure the Red output level.
3. Align the 'Blend intensity' parameter such, that the blended signal is 65 % of the black-white amplitude. In practice, this is about 1.3 V (blended signal) versus 2 V (full white signal).
4. The parameter can be adjusted in between 0 and 31.

8.3.3 Drive

Method 1 (with colour analyser):

1. Select '**Test pattern**' and turn it 'On'. During the following alignments, you will get a white block in middle of the screen.
2. Select '**Cathode**' and adjust the set to the correct light output. This setting depends on the picture tube size and brand. See table 'Cathode parameter' for the colour analyser readings.
3. Select a '**Colour Temperature**' (Cool', 'Normal' or 'Warm').
4. Adjust the white level (via '**Red**', '**Green**', and '**Blue**') according to the values in table 'White levels'.

Table 8-2 Cathode parameter

CRT	Light output (cd/m^2)
28" RF WS	400
29" RF 4:3	400
32" RF WS	380
36" RF WS	330

Table 8-3 White levels

ColourTemp. (K)	Cool (10200)	Normal (8700)	Warm (6500)
X	280	289	313
Y	287	299	329

Method 2 (without colour analyser):

Without having a colour-analyser, one can set some parameters. This is the next best solution. The setting-parameters are average values coming from production (statistics).

1. Select '**Cathode**' and enter the value '15' (for all picture tubes).
2. Select a '**Colour Temperature**' (Cool', 'Normal' or 'Warm').
3. Set the '**Red**', '**Green**' and '**Blue**' parameters according to the values in table 'Tint settings'.
4. '**Red BL offset**': herewith the Black Level can be aligned very precise (default value is 7).
5. '**Green BL offset**': herewith the Black Level can be aligned very precise (default value is 6).

Table 8-4 Tint settings

	∆ Cool	Normal	∆ Warm
R	-1	37	+3
G	0	30	0
B	+4	31	-10

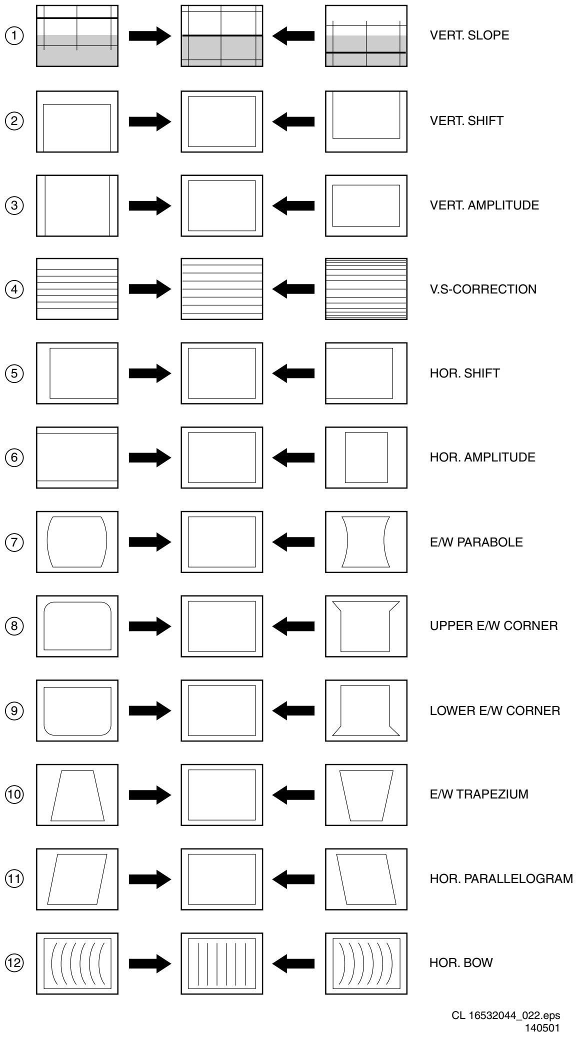
8.3.4 Lum. Del. (Luminance Delay)

With this alignment, you place the luminance information exactly on the chrominance information (brightness is pushed onto the colour). Use a colour bar/grey scale pattern as test signal (default value = 11 for all).

- **Lum. Delay PAL BG:** Apply a PAL BG colour bar/grey scale pattern as a test signal. Adjust this parameter until the transients of the colour part and black and white part of the test pattern are at the same position.
- **Lum. Delay PAL I:** Apply a PAL I colour bar/grey scale pattern as a test signal. Adjust this parameter until the transients of the colour part and black and white part of the test pattern are at the same position.
- **Lum. Delay Secam:** Apply a SECAM colour bar/grey scale pattern as a test signal. Adjust this parameter until the transients of the colour part and black and white part of the test pattern are at the same position.
- **Lum. Delay Bypass:** apply a NTSC colour bar/greyscale pattern as a test signal. Adjust this value until the transients of the colour and black & white part of the test area are at the same position.

8.3.5 Geo-Nor (Normal Geometry)

Note: Use for all geometry alignments an **external** pattern generator with a geometry pattern (e.g. crosshatch).



CL 16532044_022.eps
140501

Figure 8-3 Geometry Alignments

Service tip: When the set is equipped with a rotation coil, use this menu item to check its correct alignment. If alignment is not correct, go to the INSTALLATION menu, choose SETUP, press OK, and choose PICTURE TILT. With the use of a crosshatch test pattern, align it to a correct horizontal picture.

V. slope
Align the zero crossing of the frame deflection to the mechanical middle of the picture tube.

1. First set the start conditions for 16:9 sets: 'V. S-correction' value on '8' for the 28", '26' for the 29", '16' for the 32", or '20' for the 36" sets. Position the boundary-stripes of the test pattern on the edges of the picture tube.
2. Align 'V. slope' (during alignment, the lower half of the picture is blanked) such, that the middle line of the test pattern is matched with the edge of the pattern transient in the middle of the picture.
3. Repeat the alignment if necessary.

V. shift and V. amplitude (vertical alignment)
Align the vertical centre and height of the picture.

1. Use 'V. amplitude' to align the vertical amplitude so that the entire test pattern is visible.
2. Set 'V. shift' to value '32'.
3. Connect a voltmeter (V_{DC}) between R3624 and 'hot' ground.
4. Adjust the DC voltage to '0' with potmeter R3642 (see figure 8-1).
5. Use 'V. shift' again to align the test pattern roughly vertically in the middle.
6. Repeat the alignment if necessary.

V. S-correction
Align for equal blocks on top, middle, and bottom of the picture tube.
Align 'V. S-correction' such that a block at the top (or bottom) of the picture has the same height as a block in the middle of the picture.

H. shift and H. amplitude (horizontal alignment)

1. Use 'H. amplitude' to align the horizontal amplitude so that the entire test pattern is visible.
2. Use 'H. shift' to align the picture horizontally in the middle.
3. Repeat the 'H. amplitude' alignment if necessary.

Note: In case the horizontal linearity in wide-screen mode is out of tolerance, add a 'DC-shift correction' panel (3104 328 06230) to connector 1419 of the DAF-panel [diagram I]. On the DC-shift panel, cut diode **6433** for correction to the right or diode **6432** for correction to the left.
Caution: Be sure to switch 'off' the set first. **Never plug in a not pre-aligned module in a playing set!**

East/west alignment

1. Use 'East/West Parabola' to align the vertical lines until straight.
2. Use 'Upper East/West corner' to align the vertical lines in the upper corners until straight.
3. Use 'Lower East/West corner' to align the vertical lines in the lower corners until straight.
4. Use 'East/West Trapezium' to align for a rectangular.
5. Use 'Horizontal Parallelogram' to align for straight vertical lines if necessary.
6. Use 'Horizontal Bow' to correct the E/W parabola such, that it becomes symmetrical.

Repeat steps 1 to 6 if necessary.

8.3.6 Geo-4:3 (4:3 geometry alignment in 16:9 sets)

1. Use 'East/West Parabola' to align the vertical lines until straight.
2. Use 'Upper East/West corner' to align the vertical lines in the upper corners until straight.
3. Use 'Lower East/West corner' to align the vertical lines in the lower corners until straight.

8.3.7 Geo-SW (Super Wide geometry alignment in 16:9 sets)

You only need to set the following values (if the normal geometry alignment has been performed correctly):

1. 'V. S-Correction', enter value of 'normal geometry' alignment.
2. 'H. amplitude', enter value of 'normal geometry' alignment subtracted by '1'.
3. 'East/west Parabola', enter value of 'normal geometry' alignment.

8.3.8 Geo-100Hz (Digital Scan geometry alignment)

As all alignments are done in Pixel Plus mode (at 75 Hz), the 100 Hz mode needs an extra alignment:

- Select '100Hz Geometry'. The set automatically switches to 100 Hz mode.
- V. slope: Match the middle line of the test pattern with the upper edge of this blanking picture.
- After the alignment, return to the previous menu. The set automatically returns to 'Pixel Plus' mode.

8.4 Option Settings

8.4.1 Introduction

The microprocessor communicates with a large number of I^{2}C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence / absence of these specific ICs (or functions) is made known via the option codes.

You can set the 'hardware related' options via the SAM - 'Alignments' - 'Options' or 'Option Numbers' menu.

You can set the 'software related' options via the SAM - 'Dealer Options' menu.

After you have changed the option(s), save them via the 'Store' command.

The new option setting is only active after the TV is switched OFF and ON again via the mains switch (the EAROM is then read out again).

8.4.2 Options

Select this sub-menu to set the initialisation codes (= options) of the set via text menu's.

Table 8-5 Option overview

Menu-item	Subjects	Options	Physically in the set
Dual screen	PIP / Dual Screen	Yes	Feature present.
		None	Feature not present.
	Text / EPG	Yes	Feature present.
		No	Feature not present.
	NextView type	Flashram	Flash-RAM present.
		No Flashram	Flash-RAM not present.
Picture Tube	CRT Type	4:3	4:3 picture tube.
		16:9	16:9 picture tube.
	Picture Rotation	Yes	Frame rotation circuitry present (diagram A5).
		No	Frame rotation circuitry not present .
	CRT size	28 / 32 / 36 29 / 34 / 38	CRT size (in inches).
	Anti Moire filter	Yes	Feature present.
		No	Feature not present.
Video repro	Featurebox type		Eagle not present.
		Eagle	Eagle present.
	Lightsensor	Yes	Feature present.
		No	Feature not present.
	2D Combfilter	Yes	Feature present.
		No	Feature not present.
	Picture improvement	Yes	LTP (TOPIC) present.
		No	LTP (TOPIC) not present.
	Auto Scavem	Yes	Feature present.
		No	Feature not present.
	(WS) Signalling bits	Yes	For 16:9 sets
		No	For 4:3 sets
Audio Repro	Dolby	None	Set without Dolby.
		Pro Logic	Set with Dolby ProLogic.
	Rear speakers	Corded	Passive surroundbox present.
		Virtual	Virtual Dolby (without rear speakers).
		Cordless	Wireless active surroundbox present.
	Subwoofer present	Yes	Feature present.
		No	Feature not present.
	Acoustic system	FL11	'Soft' design (with 'flying saucer' on top of rear cover).
		FL12	'Edgy' design with full range speakers (no centre sp.).
		PV02	'Edgy' design for 4:3 sets.
	Virtual Dolby	Yes	Feature present.
		No	Feature not present.
	AVL	On	Automatic Volume Limiter 'on'.
		Off	Automatic Volume Limiter 'off'.
Miscellaneous	Home Cinema	Yes	Set with Home Cinema Link (EU only)
		No	Set without Home Cinema Link
	Integrated RC	Yes	Feature present.
		No	Feature not present.
	Tuner type	Philips	Set with Philips tuner.
		Alps	Set with Alps tuner.
	38.0 IF	Yes	For AP PAL-multi set.
		No	For non AP PAL-multi sets
	Integrated DVD	Yes	Feature present.
		No	Feature not present.
	P50 DVD menu line	Yes	Feature present.
		No	Feature not present.
Option no.	Group 1		Group 1 option code overview.
	Group 2		Group 2 option code overview.

8.4.3 Option numbers

Select this sub-menu to set all options at once (expressed in two long numbers).

An option number (or 'option byte') represents a number of different options. When you change these numbers directly, you can set all options very fast. All options are controlled via eight option numbers.

When the EAROM is replaced, all options will require a re-setting. To be certain that the factory settings are reproduced exactly, you must set both option number lines. You can find the correct option numbers on a CRT sticker inside the TV set.

Example: The CRT sticker in the 32PW9527 gives the following option numbers:
04866 04384 08001 00016
12407 00001 00000 00071
The first line (group 1) indicates options 1 to 4, the second line (group 2) options 5 to 8 (see tables below).
Every 5-digit number represents 16 bits (so maximum number can be 65536 if all options are set).
When all the correct options are set, the sum of the decimal values of each Option Byte (OB) will give the option number.

Table 8-6 Option bytes Group 1

OB	Bit	Option name	Settings(in decimal values)	Option number
1	0 1 2	Featurebox	0 = Eco (n/a) 1 = Prozonic (n/a) 2 = Melzonic (n/a) 3 = Eagle 4 = Falconic 5 = Falconic+	Sum OB1
	3	2D Comb Filter	0 = Off 8 = On	
	4	Auto-Scavem	0 = Off 16 = On	
	6	Light Sensor	0 = Off 64 = On	
	7	Luma Trans. Proc.	0 = Off 128 = On	
	12	WSS	0 = Off 4096 = On	
	13	3D Comb Filter	0 = Off 8192 = On	
2	1	Dolby ProLogic	0 = Off 2 = On	Sum OB2
	2	Virtual Rear Spkrs	0 = Off 4 = On	
	3	Cordless Rear Spkrs	0 = Off 8 = On (EU)	
	5	Virtual Dolby	0 = Off 32 = On	
	6 7	Subwoofer	0 = Not present 64 = Present	
	13	EPG Type (EU only)	0 = Type 2 8192 = Type 2C3	
3	2	AV4 (2fH)	0 = Off (EU) 4 = On (AP/US)	Sum OB3
	3	AV3 (2fH)	0 = Off (EU) 8 = On (AP/US)	
	4	Dual Screen	0 = None (EU) 16 = PIP/DS (AP/US)	
	6	TXT/EPG/DS	0 = Off (AP/US) 64 = On	
	8	Aspect Ratio	0 = 4:3 256 = 16:9	
	9	Tilt	0 = Off 512 = On	
	13	Integrated DVD	0 = Off 8192 = On	
	14	Home Cinema	0 = Off 16384 = On (EU)	
	15	Integrated RC	0 = Off 32768 = On (EU)	
4	2	China IF	0 = Off 4 = On	Sum OB4
	3	Tuner	0 = Philips 8 = Alps	
	13	DVD-door lock	0 = Off 8192 = On	

Table 8-7 Option bytes Group 2

OB	Bit	Option name	Settings(in decimal values)	OB
5	1 2	Auto Store Mode	0 = None (AP/USA) 2 = PDC/VPS 4 = TXT Page 6 = PDC/VPS/TXT Page	Sum OB5
	4	Picture Mute	0 = Off 16 = On	
	6	Virgin	0 = Off 64 = On	
	12	TXT Preference	0 = TOP 4096 = FLOF	
6	0	P50 DVD menu-line	0 = Off 1 = On	Sum OB6
7				Sum OB7
8	0 1 2 3	Cabinet	0 = FL6 (n/a) 1 = FL7 (n/a)2 = FL8 (n/a) 3 = FL9 DAS (n/a) 4 = FL9 Monitor (n/a) 5 = FL10 (n/a) 6 = FL11 7 = FL12 8 = FL14 (n/a) 9 = PV02	Sum OB8
	6	AVL	0 = Off 64 = On	
	8 9 10 11	Picture tube size	0 = 28" 256 = 32" 384 = (n/a) 512 = 36" 768 = 29" 1024 = 34" 1280 = 38" 2048 = (n/a)	
	12	Anti-moire	0 = Off 4096 = On	

8.4.4 Dealer Options

Table 8-8 Dealer options overview

Menu name	Subjects	Options	Physically in set
Personal Options	Picture Mute	Yes	Picture mute active in case no picture detected
		No	Noise in case of no picture detected
	Virgin Mode	Yes	TV starts up once with language selection menu after mains switch on for the first time (virgin mode)
		No	TV does not starts up once with language selection menu after mains switch on for the first time (virgin mode)
	Auto Store Mode	None	Autostore mode disabled (not in installation menu)
		PDC-VPS	Autostore mode via ATS (PDC/VPS) enabled
		TXT page	Autostore mode via ACI enabled
		PDC-VPS-TXT	Autostore mode via ACI or ATS enabled
	TXT Preference	TOP	Preference to TOP Teletext
		FLOF	Preference to FLOF Teletext

9. Circuit Descriptions and Abbreviation List

Index of this chapter

1. Introduction
2. Block diagram
3. Power supply
4. Control
5. Tuner & IF
6. Video: High-end Input Processor
7. Video: Feature box
8. Video: High-end Output Processor
9. Synchronisation
10. Horizontal deflection
11. Vertical deflection
12. Audio
13. Teletext / NexTView
14. CRT Panel / Rotation
15. Auto-Scavem
16. Software related features
17. Abbreviation list
18. IC Data Sheets

9.1 Introduction

The base for the 95xx Europe segment for the year 2002 is the EM5 platform, which is the successor of the EM3 platform.

The EM2, EM3, and the EM5, make use of the same architectural set-up, which consists of a full sized LSP/SSP combination and a smaller double sided four layer SSB, which is mounted on the SSP using a SIMM connector. The main functionalities of the LSP are supply, deflection, and sound amplification.
The main functionalities of the SSP are tuner input, SIMM interface, I/O and interface provisions for extended functions such as PIP.
The main functionalities of the SSB are the core TV functionalities, being TXT/control, video and audio decoding, feature box, video featuring, and sync/geometry control.

The LSP (single sided) is built up very conventional, with hardly any surface mounted components on the copper side. Similar with the EM3 (but different as with the MG-chassis), the EM5 LSP has a very large 'hot' part, including both deflection coils.

The SSB is a high tech module (four layer, 2 sides reflow technology, full SMC) with very high component density and complete shielding for EMC-reasons. Despite this, it is designed in such a way, that repair on component level still is possible. To achieve this, attention was paid to:

- The position of service test lands: most of them are at the Tuner side.
- Accessibility (Tuner side). If there are still problems with the accessibility, one can order an extension board (see parts list).
- Clearance around surface mounted ICs (for replacing).
- Detailed diagnostics and fault finding is possible via ComPair.

In the architecture, provisions are made for more features/ extensions like:

- Pixel Plus.
- Auto TV.
- Double Window/PIP.
- Wireless surround sound.
- Integrated DVD-player.

9.2 Block Diagram

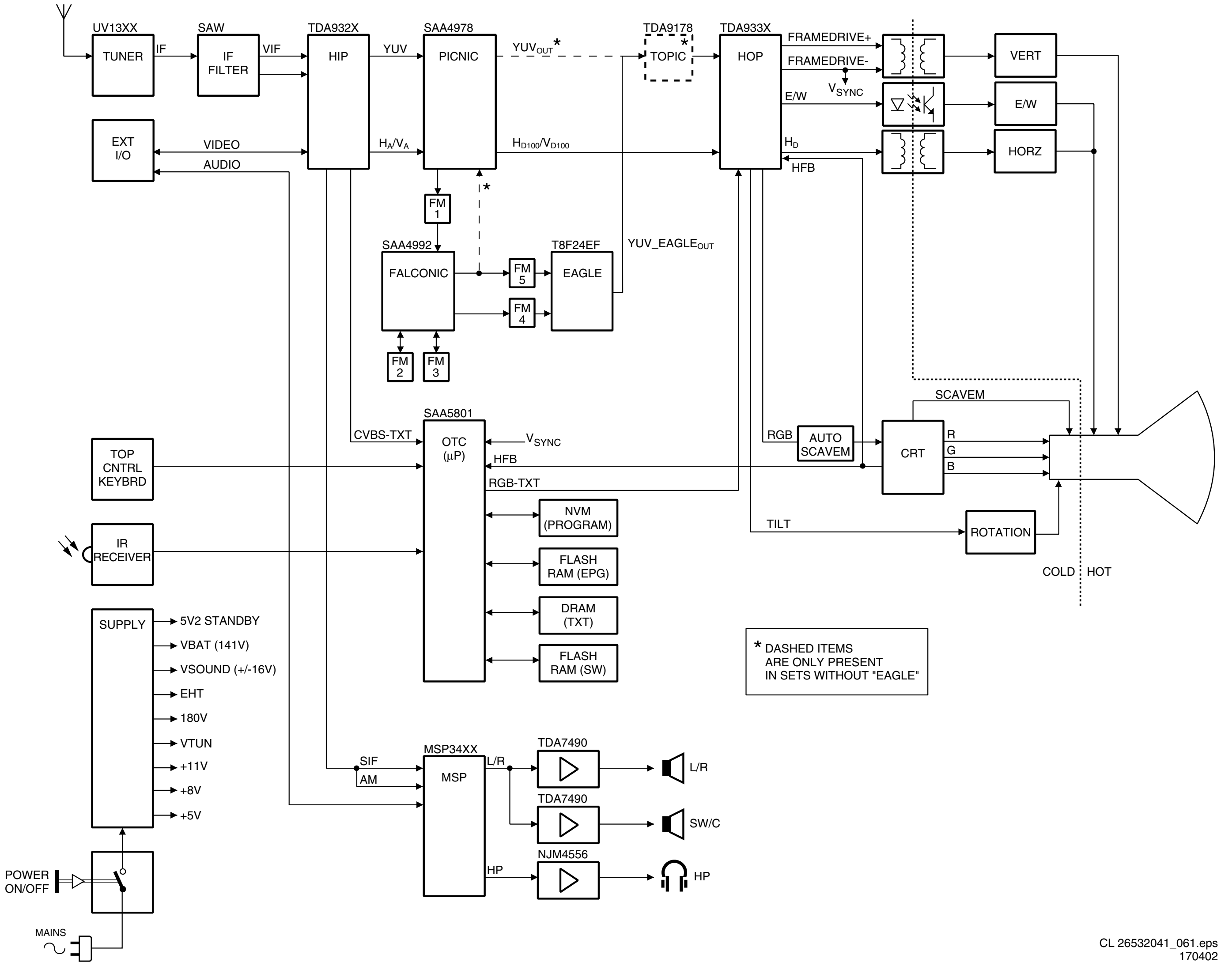

UV13XX
TUNER
IF
SAW
IF FILTER
VIF
TDA932X
HIP
YUV
SAA4978
PICNIC
YUV_OUT *
TDA9178
TOPIC
*
TDA933X
HOP
FRAMEDRIVE+
FRAMEDRIVE-
V_SYNC
E/W
H_D
HFB
VERT
E/W
HORZ
EXT I/O
VIDEO
AUDIO
H_A/V_A
H_D100/V_D100
FM 1
*
SAA4992
FALCONIC
FM 5
FM 4
T8F24EF
EAGLE
YUV_EAGLE_OUT
FM 2
FM 3
SCAVEM
SAA5801
CVBS-TXT
OTC (µP)
V_SYNC
HFB
RGB-TXT
RGB
AUTO SCAVEM
CRT
R
G
B
TOP CNTRL KEYBRD
IR RECEIVER
NVM (PROGRAM)
FLASH RAM (EPG)
DRAM (TXT)
FLASH RAM (SW)
TILT
ROTATION
COLD
HOT
SUPPLY
5V2 STANDBY
VBAT (141V)
VSOUND (+/-16V)
EHT
180V
VTUN
+11V
+8V
+5V
* DASHED ITEMS ARE ONLY PRESENT IN SETS WITHOUT "EAGLE"
SIF
AM
MSP34XX
MSP
L/R
HP
TDA7490
TDA7490
NJM4556
L/R
SW/C
HP
POWER ON/OFF
MAINS
CL 26532041_061.eps
170402

Figure 9-1 Block Diagram

The Tuner (item 1200) is a PLL tuner and delivers the IF-signal, via audio & video SAW-filters, to the HIP (High-end Input Processor). The HIP has the following functions:

- IF modulation.
- Video source- and record select.
- Colour decoder.
- Synchronisation.

Three SCART-connectors can be used:

- SCART1 is fully equipped,
- SCART2 is meant for VCR. Pin 10 is used for Easylink and there is a possibility for Y/C in. The CVBS-out on pin 19 is meant for WYSIWYR (What You See Is What You Record).
- SCART3 is a RGB/CVBS and audio L/R input.

The HIP delivers YUV and sync signals to the PICNIC. This IC takes care of:

- Analogue to Digital conversion and vice versa.
- 50 to 100 Hz conversion.
- Panorama mode.
- Noise reduction.
- Dynamic contrast.

The '2fH features'-block in the diagram gives several options:

- For Digital Scan, the PICNIC is required.
- For Natural Motion, the FALCONIC is required.
- For Pixel Plus, the EAGLE is required.

After the PICNIC the, now 100 Hz, YUV-signals are fed to the FALCONIC for 'Natural Motion', followed by the Eagle for 'Pixel Plus' enhancement (if present). The processed YUV signals (from Eagle or PICNIC) are, together with the sync-signals from the PICNIC, then fed to the HOP (High-end Output Processor). This IC handles the video control and geometry part. The RGB-signals for TXT/OSD (from the P) are also inserted via the HOP. The video part delivers the RGB signals to the CRT-panel and the geometry part delivers the H-drive, V-drive, and a drive-signal for rotation.

Both deflection circuits are 'hot' and located on the LSP. They are driven by the HOP. To make a galvanic separation, the Line Drive is driven via transformer 5410 and the Frame Drive via transformer 5621.The horizontal output stage generates some supply voltages and the EHT-, focus- and Vg2-voltages.

The RGB amplifiers on the CRT-panel are supplied with 200 V from the LOT.
The Auto-SCAVEM circuit modulates transitions of the Luminance (Y) signal on the horizontal deflection current, giving a sharper picture.

The sound part is built around the MSP34xx (Multi-channel Sound Processor) for IF sound detection, sound control and source selection. Dolby decoding is also done by the MSP.

Amplification is done via a 'class D' integrated power amplifier IC, the TDA7490.

The microprocessor, called OTC (OSD, Teletext and Control) takes care of the analogue TXT input- and output processing. The OTC, ROM, and RAM are supplied with 3.3 V, which is derived from the +5V2.
The NVM (Non Volatile Memory) is used to store the settings, one Flash-RAM contains the set software, the other Flash-RAM (7012) is for EPG, and the DRAM is used for storing the Teletext pages.

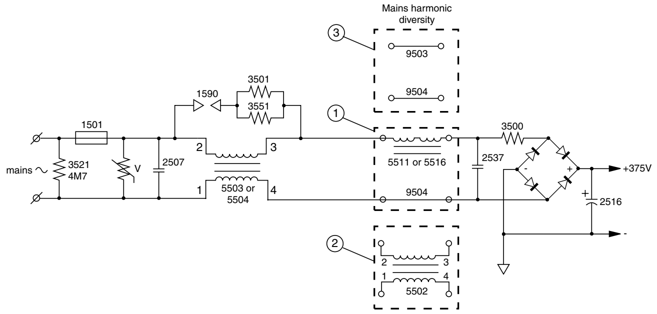
There is a separate Standby Supply, in order to reduce the Standby power consumption. During Standby, the Main Supply is switched 'off' (via TS7529).
A relay (1550) is used to switch the Degaussing circuit. It is switched 'on' after set start-up and switched 'off' by the P after 12 s.
The Main Supply, an SMPS based on the 'down-converter' principle, generates the 141 V (V_{BAT}) and the +/- 16 V for the audio part.
Note: Voltage V_{BAT} is not mains isolated ('hot'), but is alignment free.

9.3 Power Supply (Diagram A1 & A2)

The power supply has a number of main functions:

- Mains harmonic filter.
- Degaussing picture tube.
- Standby power supply.
- Main supply.

9.3.1 Mains Harmonic Filter (Diagram A1)


Mains harmonic diversity
3
9503
9504
1
1590
3501
3551
1501
3500
mains
3521 4M7
V
2507
2
3
1
4
5503 or 5504
5511 or 5516
9504
2537
+375V
2516
2
5502

CL 16532044_020.eps
140501

Figure 9-2 Mains harmonic filter circuitry

The mains harmonic filter has two functions: to prevent that high frequency signals (harmonics) are transferred into the mains and to protect the set from lightning damage.

C2507 prevents that the high frequency signals, generated by the set, are conveyed into the mains (it forms a short-circuit).

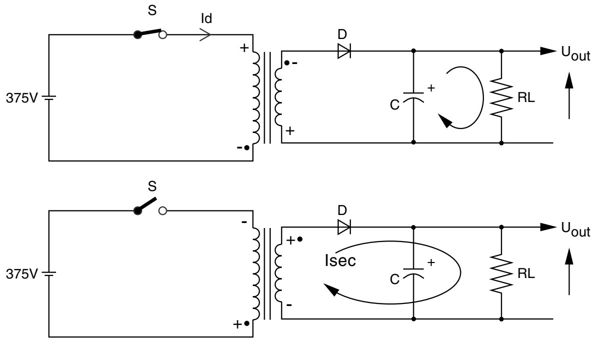
In case of a lightning surge between the 2 phases (differential mode), the energy is immediately bled away through the VDR (R3509) to the other phase.
In case of a lightning surge on both phases of the mains in relation to the aerial earth (common mode), the filter acts as a high resistance (U_{EMK} = L * dI/dt), as a result of which the voltage across coil L5503/04 increases. A spark gap (1590) prevents that the voltage increases too much, which would lead to a damaged coil. When ignited, the current will be discharged via this spark gap.
Resistor R3500 is used for limiting the inrush-current.

9.3.2 Degaussing (Diagram A1)

As soon as the set is switched 'on' via the mains switch, the 5V2 is present. As the 'DEGAUSSING' signal from the processor (OTC) is 'low', transistor 7528 will conduct and relay 1550 is activated. Initially a considerable current will flow, via PTC 3516, through the degaussing coil. The PTC will heat up, resistance will rise, and the current will decay rapidly. The OTC makes the 'DEGAUSSING' signal 'high' after 12 s, which will switch 'off' the relay.

9.3.3 Standby power supply (Diagram A2)

Principle
This power supply is delivering the standby voltage, but also the main voltages for the small signal part. It is a SOPS type (Self-Oscillating Power Supply) and is regulated by the controlled switching of an oscillator. It uses the so-called 'Flyback' principle:

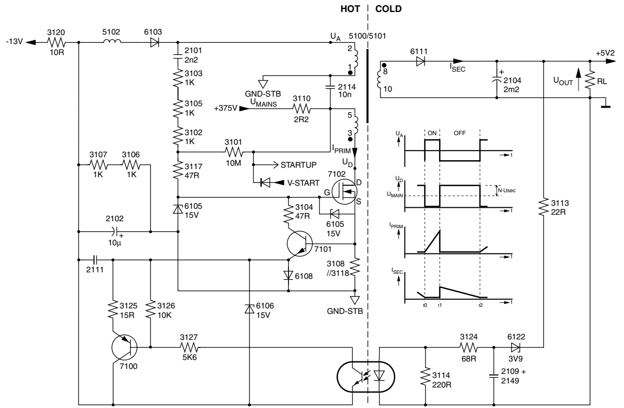

S
Id
D
Uout
375V
C
RL
S
D
Isec
Uout
375V
C
RL

96532156_020.eps
210100

Figure 9-3 Flyback principle

After closing switch 'S', the current I_D will increase linear in time. The magnetic energy in the primary coil is directly proportional with the self-inductance of the coil and current I_D (thus with the time the switch is closed).
The voltage polarity at the secondary winding is negative (due to different winding direction), meaning that diode D will block. Capacitor C will discharge via R_L, U_{OUT} will decrease.
Opening switch 'S' will generate a counter-e.m.f. in the primary winding, trying to maintain current I_D. Through this the polarity of the secondary voltage will inverse. The magnetic energy, stored in the coil, will now be transformed to the secondary side. Diode D will now conduct, capacitor C will be charged and U_{OUT} will increase.

Implementation


HOT
COLD
-13V
3120 10R
5102
6103
2101 2n2
3103 1K
3105 1K
3102 1K
UA 5100/5101
GND-STB
UMAINS
+375V
3110 2R2
2114 10n
6111
ISEC
2104 2m2
UOUT
RL
+5V2
3107 1K
3106 1K
3117 47R
3101 10M
STARTUP
V-START
7102
IPRIM
UD
6105 15V
3104 47R
2102 10µ
2111
7101
3108 //3118
6108
GND-STB
3125 15R
3126 10K
6106 15V
7100
3127 5K6
7103/7104
3124 68R
6122 3V9
3114 220R
2109 + 2149
3113 22R
ON
OFF
UMAIN
N.Usec
IPRIM
ISEC
t0
t1
t2

CL 26532041_062.eps
110402

Figure 9-4 Standby supply circuitry

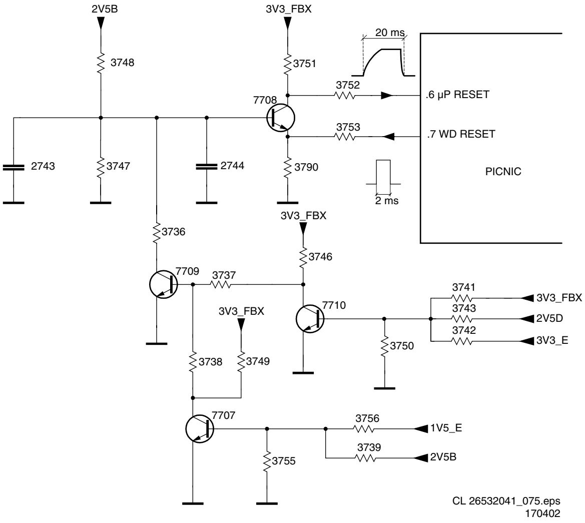
To apply this on the EM5E (diagram A2): replace switch 'S' by FET TS7102, coil L by L5101/L5100, diode D by D6111, and C by C2104.

- **Time interval t0-t1:** After switching 'on' the TV-set, the gate of MOSFET TS7102 will be high (max. 15 V due to zener diode D6105). This will drive the FET into saturation

(U_{DS} = 0 V). The DC-voltage U_{MAINS} will be transposed across the primary winding of L5101 (3, 5), resulting in a linear increasing current through this coil. The voltage across the co-coupled coil (1, 2) is also positive and will keep the FET into conductivity via C2101, R3103/3105/3102 and R3117 for some time. The self-induction of the coil and the magnitude of the supply voltage (+375 V) determine the slope of the primary current. The maximum current is determined by the time the FET stays into conductance (t0-t1). This time is directly determined by the voltage across R3108//R3118 (0.7 Ω). This voltage is a measure of the current and if it exceeds 1.4 V, TS7101 will be driven into conductivity and consequently connects the gate of TS7102 to earth. The FET will block. The current is: 1.4 V / 0.7 Ω = 2 A. The voltage across the secondary winding (8, 9) will be negative, diodes D6111 and D6107 will block.

- **Time interval t1-t2:** The sudden current interruption in the primary coil will induce a counter-e.m.f. that wants to maintain the current. The voltage on the drain of the FET will increase. The secondary voltage (8, 9) will become positive and will charge C2104 via D6111. All energy that was stored in L5101 during t0-t1 will be transferred into the load. Due to the transformer principle, a voltage will now be induced in the primary winding (3, 5) and the co-coupled winding (1, 2). This voltage will be N* U_{SEC} (N= winding ratio). The voltage across the co-coupled coil will be negative, keeping the FET blocked.
- **Time t2:** At t2, the current through the secondary coil will be reduced to zero, as C2104 is no longer charged. Consequently, the voltages will decay and will change polarity. The gate of the FET will be again made positive, is driven into conductivity and the cycle starts again.

Power On Reset (POR)



CL 26532041_075.eps
170402

Figure 9-5 Power On Reset

Via a reset circuit (TS7708) a reset pulse (POR) of 20 ms is generated for the µP inside the PICNIC and for the ROM. After 'power on', the 3V3 is built up (derived from the 5V2). Transistor TS7708 blocks and pin 6 of the PICNIC will follow the rising slope of the power supply. As soon as the power supply is stabilised, capacitor C2744 will charge (via R3748). When this voltage reaches 0.6 V (after 20 ms), TS7708 starts to conduct, and the voltage at pin 6 goes low again. The µP is reset now. If the PICNIC cannot communicate with the ROM, the 'watchdog' will generate a reset pulse (on pin 7), which will re-start the cycle again.

If one of the power supplies is absent (or too low), then a safety problem can occur in some cases (e.g. a too high temperature of the stabiliser). To prevent this from happening, the voltage dividers at the bases of the transistors TS7710 and TS7707 are calculated such that they will block when above described situation occurs. In this case, the base of TS7708 is kept 'low' by the conducting TS7709, until the problem is solved. The µP receives no POR pulse, and cannot be reset.

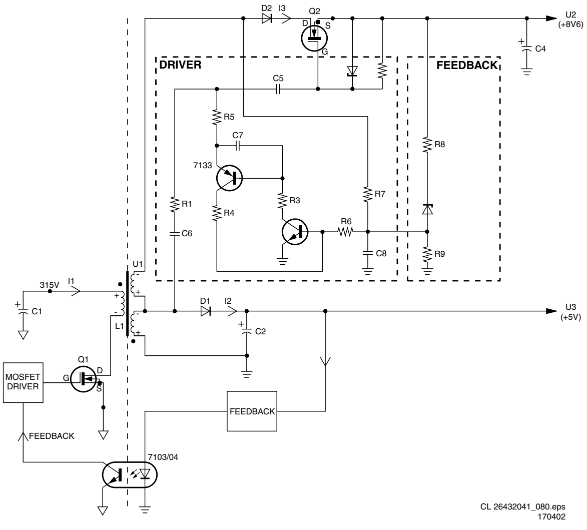
5V2 Stabilisation and Feedback

The Standby Power Supply always oscillates at maximum power. The only limiting factor is the maximum primary current, which has been pre-set with R3108//3118.
R3113, zener diode D6122, R3124, and R3114 determine U_{OUT}. If the voltage across R3114 exceeds the threshold voltage of the diode of the optocoupler 7104 (± 1 V) or, in other words, U_{OUT} exceeds 5.2 V, the transistor of the optocoupler will conduct.
Transistor TS7100 is now driven, and a negative voltage will be transposed to the emitter of TS7101. When TS7101 conducts, the gate of the FET is at earth potential, forcing the oscillator stop. Due to the load, the secondary voltage U_{OUT} will decrease. At a certain voltage, optocoupler TS7104 will block and the oscillator will start again.
Since there are no capacitors, and there is a high amplification factor in the feedback circuit, the feedback is ultra-fast. This is why the ripple on U_{OUT} is minimal. The negative supply voltage (-20 V) used in the feedback circuit, originates from the co-coupling coil, and is rectified through D6103.
Stabilisation is not effected through duty-cycle control but through burst-mode of TS7100.
Burst-mode is load dependent. If the power supply is less loaded, the secondary voltage will have the tendency to increase more rapidly. If the load on the power supply increases, then the oscillator stops less often, right up to the moment that the oscillator is operating continuously: maximum load. If the power supply is now loaded even more, the output voltage will decay. The maximum primary current set by R3108//3118 determines the maximum load.

8V6 Stabilisation and Feedback

In general with a fly-back supply with multiple output, as used in the EM3, one of the output voltages is controlled via the primary feedback loop. The additional secondary output voltages are determined via the turn-ratio of the transformer. It is often seen that a linear voltage regulator is used for post regulation of the non-primary regulated secondary voltages. Disadvantage of this approach is the power loss in the linear voltage regulator.

For the EM5E, a power economic solution is achieved, by implementing a kind of secondary down-converter. The advantage, compared to conventional down-converter, is that no extra coil is required. It is using the inductance of the main transformer. In this way one large current coil, a power diode and one elcap are saved.



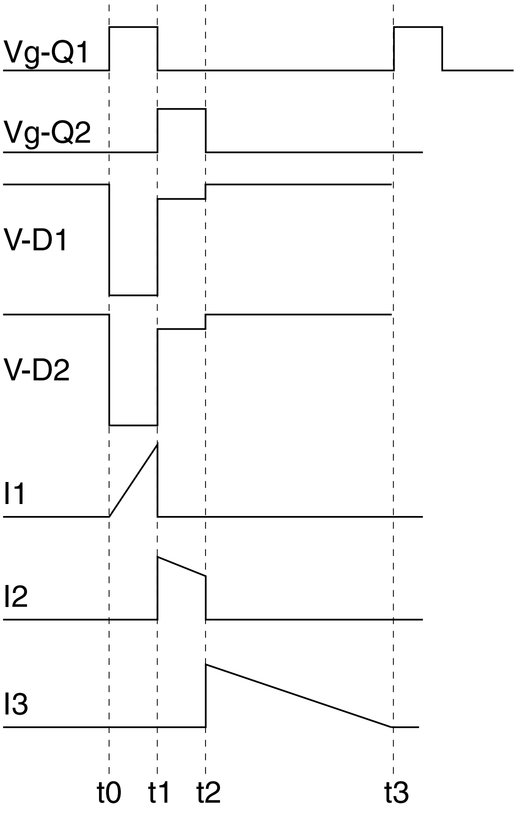
CL 26432041_080.eps
170402

Figure 9-6 Circuit principle

A basic fly-back converter is used, with a MOSFET Q1, transformer L1, and a primary feedback circuit. The output of the primary controlled voltage is U1.

The additional secondary controlled supply consists of D2 and Q2, with output voltage U2.

The main fly-back supply is working independently, where the duty cycle is controlled via the primary feedback, and the MOSFET Q1 is switching at a certain frequency. MOSFET Q2 is also switching at the same frequency, as it is synchronised with Q1.



CL 26432041_079.eps
170402

Figure 9-7 Timing diagram

- **Time interval t0-t1:** The primary MOSFET Q1 is switched 'on', both diodes D1 and D2 are blocked.
- **Time interval t1-t2:** MOSFET Q1 is switched 'off' and Q2 is switched 'on'. During this period, the energy is transferred to output U2 of the supply. Diode D1 is blocked, because U3 is lower than U1.
- **Time t2:** Q2 is switched 'off'.
- **Time interval t2-t3:** During this period, the rest of the energy will be transferred to output U1.

The two controllers, the primary feedback for U1, and the secondary feedback for U2, all work independently.
The secondary voltage U2 is controlled by the 'on' time of Q2. As soon as the load on U2 increases, the 'on' time of Q2 (the period t1-t2) is automatically increased by the secondary feedback. More energy will be taken by the output U2, and less energy will be transferred to U1. Automatically U1 will drop. The primary feedback loop will change the primary drive to enlarge the total amount of energy to be transferred, from the primary side, and U1 will rise again.

Protection

If the optocoupler would fail, the secondary voltage will increase. This would have disastrous consequences since many ICs (e.g. OTC, Flash-RAM and DRAM) are fed with this 5.2 V. In other words, very expensive repairs would be required.
We already know that the negative supply is directly dependent upon the secondary 5.2 V, because of which the negative supply will increase proportionally as the secondary voltage increases.
If the negative supply in the mean time reaches -25 V, D6106 will start to zener and therefore TS7101 will start conducting. D6106 will take over the stabilisation task of the optocoupler, however, with a considerable spread: from -20 to -25 V is a 25 % increase, thus U_{OUT} will increase from 5.2 V to max. 6.5 V.

Tuner Supply

The Standby supply produces two voltages for the Tuner: +33V (V_{TUN}) and +5VT.
The +33V is the tuning voltage for the Tuner.
The +5VT is derived from the +8V with stabiliser 7912 (see diagram A8), and is used to supply the tuner only.

SSB Supply

There are several voltages going to the SSB: +8V6, +5V2 and +3V3.
The +5V2 and +8V6 (always present) come directly from the Standby power supply.
The +3V3 is derived from the +5V with stabiliser 7910 (diagram A8).

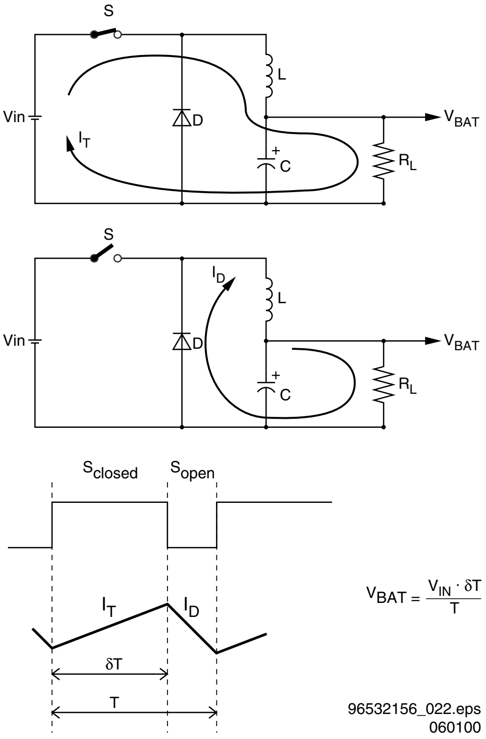
9.3.4 Main Supply (Diagram A1)

The main power supply is able to deliver a continuous power between 100 W and 160 W.
Some **important** notes on beforehand:

- V_{BAT} is not isolated from the main supply ('hot').
- V_{BAT} is alignment free.

Principle

The Main Power Supply, generates the 141 V (V_{BAT}) and the +/- 16 V for the audio part. It is based on the so-called 'down converter' principle.



96532156_022.eps
060100

Figure 9-8 Down-converter principle

1. After closing switch 'S', the linear in time increasing current I_T, will charge capacitor C.
2. Opening switch 'S' will generate a counter-e.m.f. in coil L, trying to maintain current I_T. This is possible via diode D (this diode is also called 'freewheel diode'). Therefore, after opening 'S', the magnetic energy stored in coil L will be transferred to electrostatic energy in capacitor C. The V_{IN} will only supply current during the time that 'S' is closed while a constant current is flowing through R_L.
3. V_{BAT} is directly proportional with V_{IN} and the time that 'S' is closed and reverse proportional with period time 'T'. Therefore, by changing the duty cycle, it will be possible to control V_{BAT}.

Implementation

At start-up of the main supply, C2515 (diagram A1) can be assumed as being a short-circuit. U_{AB} will be 15 V (R3513, D6510) and U_{GS} of the FET will be +5.4 V (via D6515). The FET will be driven into saturation (same as closing switch 'S'). The drain-current will increase linear in time. With other words: resistors R3513 and R3518 will start the oscillator.
The voltage across the co-coupled coil (4, 5) will keep the FET into conductivity.

The TS7502 is a low-voltage semiconductor, which drives the MOSFET TS7504. To bridge the different voltage levels, an opto-coupler (item 7507) is used. Via this opto-coupler, the DC-current through R3504 is influenced. The changed current through R3504 changes the V_{BE} of TS7502, which will influence the drive of MOSFET TS7504 (= switch 'S' in figure 'Down-converter principle').

The sudden current interruption in the primary coil will induce a counter-e.m.f. that wants to maintain the current via the 'freewheel' diode D6534. This current is linear decreasing in time and, as it is also flowing through R3514//R3515, TS7502 will be blocked after a certain period. The gate of the FET will be again made positive, is driven into conductivity and the cycle starts again.

For safety reasons, transistor TS7530 is added as a back-up solution for TS7502. If B-E of TS7502 is shorted, TS7530 takes over its function.

Stabilisation of V_{BAT}

The output voltage V_{BAT} is determined by: $V_{BAT} = V_{IN} * (T_{ON} / (T_{ON} + T_{OFF})) = V_{IN} *$ duty-cycle.
To stabilise the output voltage, a feedback loop is implemented, which will reduce T_{ON} when V_{BAT} increases and vice versa.

Via a voltage divider, existing of (1 %) resistors R3507, R3510, and R3527//3549, a voltage of 2.5 V (when V_{BAT} = 141 V) is fed to the input of precision shunt regulator 7506. This regulator will conduct, and a current will flow through the diode part of the opto-coupler 7507. The base of TS7502 will now be set at a certain positive voltage. As this transistor switches the FET TS7504 'on' and 'off', this circuit can determine the duty-cycle.
E.g. when the load increases, V_{BAT} will decrease. Consequently, the input voltage of regulator 7506 will decrease, resulting in a lower current. Via opto-coupler 7505 and transistor TS7502, T_{ON} of the FET is changed (will increase). The output voltage V_{BAT} will rise.
If the load continues to increase, the regulator will block at a certain moment. T_{ON} is now at maximum value. This is the point where V_{BAT} will go below 141 V and, at further increasing load, is switched 'off'. The voltage across the co-coupled coil (L5506, pin 4 and 5) will decrease, due to the increasing load. Therefore, the voltage on the gate of TS7504 comes below the threshold voltage. The supply switches 'off', and an audible hiccupping can be heard.
On the other hand when the load decreases, V_{BAT} will rise. Consequently, the input voltage of TS7506 will also rise, resulting in a higher current. This changes the base voltage of TS7502, and through that the T_{ON} of the FET will decrease. The output voltage V_{BAT} will be reduced.
If, for instance, V_{IN} will decrease (e.g. U_{MAINS} is 180 V i.s.o. 240 V), the slope of the drain-current will be flattened, through which the FET will be longer into conductance, keeping VOUT constant.
If, for any reason, the stabilisation circuit might fail, the output voltage V_{BAT} can never exceed 200 V (via D6514). D6514 will form a short-circuit, V_{BAT} will drop and the set will switch 'off' (this will also result in an audible hiccupping of the supply).

Switch to 'Standby' (via RC)

When the set is switched to 'Standby' mode via the Remote Control, the Main supply is switched 'off' by the circuit around TS7529 (see diagram A1).
During 'on'-state, the Main supply is fed with line pulses via the 'SUP-ENABLE' line. They are rectified and smoothed via D6517, D6516, and C2530, and fed to TS7529. Because they are less than -20 V, this transistor is blocked. When these pulses are stopped, TS7529 will be saturated and TS7502 will switch 'off'. This will switch 'off' the Main supply.

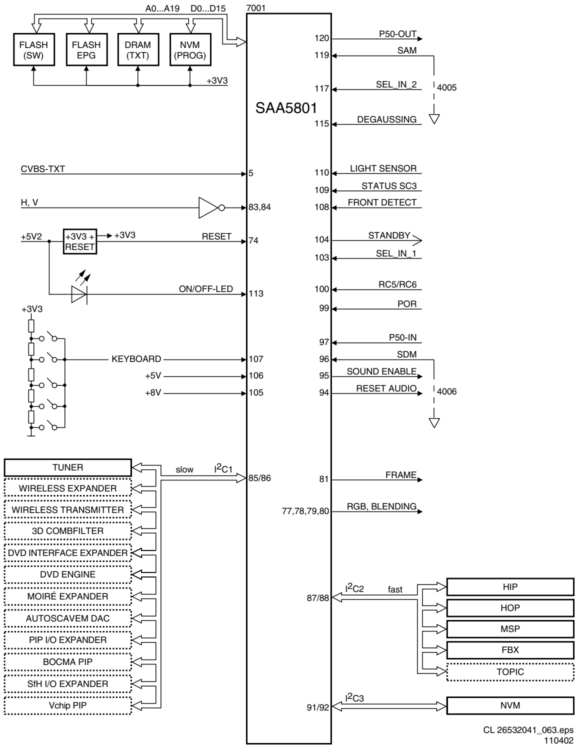
Set to 'On' (via 'SUP-ENABLE')

Via the 'STANDBY' command from the OTC, the MOSFETS 7141 and 7131 (diagram A2) are switched 'on'. When the +5V and +8V are sensed by the OTC, a command is given to the HOP to start the drive (via I^2C).
When this is sensed via the 'SUP-ENABLE' line (at the base of line transistor TS7421, diagram A3), the main supply is switched 'on' via TS7529 (diagram A1).

Audio Supply

The pulses on the secondary winding of L5506 (or L5512) are rectified by D6535 (+16 V) and D6536 (-16V), and smoothed by C2542 and C2543.

9.4 Control (Diagram B5)


A0...A19
D0...D15
7001
FLASH (SW)
FLASH EPG
DRAM (TXT)
NVM (PROG)
+3V3
SAA5801
120
P50-OUT
119
SAM
117
SEL_IN_2
4005
115
DEGAUSSING
CVBS-TXT
5
110
LIGHT SENSOR
109
STATUS SC3
H, V
83,84
108
FRONT DETECT
+5V2
+3V3 + RESET
+3V3
RESET
74
104
STANDBY
103
SEL_IN_1
ON/OFF-LED
113
100
RC5/RC6
99
POR
+3V3
97
P50-IN
96
SDM
KEYBOARD
107
+5V
106
95
SOUND ENABLE
+8V
105
94
RESET AUDIO
4006
TUNER
WIRELESS EXPANDER
WIRELESS TRANSMITTER
3D COMBFILTER
DVD INTERFACE EXPANDER
DVD ENGINE
MOIRÉ EXPANDER
AUTOSCAVEM DAC
PIP I/O EXPANDER
BOCMA PIP
SfH I/O EXPANDER
Vchip PIP
slow
I2C1
85/86
81
FRAME
77,78,79,80
RGB, BLENDING
I2C2
fast
87/88
HIP
HOP
MSP
FBX
TOPIC
I2C3
91/92
NVM

CL 26532041_063.eps
110402

Figure 9-9 Microprocessor (OTC)

9.4.1 OTC

Introduction

The SAA5801 (IC7001) is called the OTC (OSD, TXT, and Control). In this IC, the microprocessor and the TXT-decoder (level 2.5) are integrated.
Some of its functions are:

- Set control.
- TXT/OSD acquisition.
- RGB-outputs to the HOP
- Menu blending; for blending the contrast, software controlled.
- I/O-ports for I^2C, RC5/RC6, LED, and service modes.
- Error code generation.

Data Storage

- The software for EM5E can be 2 MB (Megabyte), and is stored in IC7006.
- It is possible to store 1200 TXT pages in IC7007. This is a DRAM of 4 MBit and this IC is also used to store data of a working set.
- For EPG a Flash-RAM (7012) is used.
- The Non Volatile Memory IC7011 is a 4 kB version M24C32W6.

Power Supply

All ICs in this part are supplied with 3V3. For this voltage, a 3V3 stabiliser is used (IC7005).

With the circuitry around TS7003 and 7004 (diagram B5), a reset is generated to wake up the OTC (pin 74). During this reset, all I/O pins of the OTC are made 'high'.

Via pins 105 and 106, the +8 V and the +5 V are sensed. If one of them is not present, the Main supply is switched 'off' (set in protection and the red LED will blink at 3 Hz).
The OTC will generate an error code to indicate what was wrong.

OSD/TXT

The horizontal (H_{D100}) and vertical (V_{SYNC}) sync pulses are also fed to the OTC for stable OSD and TXT.
The RGB-outputs (77/78/79) together with fading (pin 80) are fed to the HOP. The fading pin has a double function: it is used for making a transparent menu and as fast-blanking signal for TXT.

9.4.2 I^2C Bus Specifications

In the EM5E chassis with OTC-processor there are three I^2C busses used:

- Slow (max. 100 kHz) hardware I^2C-bus, called I^2C1, used for the Tuner.
- Fast (max. 400 kHz) hardware I^2C -bus, called I^2C2, used for all ICs.
- Separate short bus, called I^2C3, for the Non Volatile Memory (NVM), to avoid data corruption.

9.4.3 NVM

The Non Volatile Memory contains all set related data that must be kept permanently, such as:

- Software identification.
- Operational hours.
- Error-codes.
- Option codes.
- All factory alignments.
- Last Status items for the customer + a complete factory recall.
- Txt featuring (keeping habit watch data).
- EPG data.

9.5 Tuner & IF (Diagram A8 & B2)

The tuner is I^2C controlled, and is capable of receiving off-air, S- (cable) and Hyperband channels:

- Low (44 - 156 MHz).
- Mid (156 - 441 MHz).
- High (141 - 865 MHz).

The tuning is done via I^2C. The reference voltage on pin 9 is 33 V. This voltage (V_{TUN}) is derived from the secondary side of the standby supply, via D6110 and R3116//R3115 and a 33 V zener diode (D6200). The OTC, together with the HIP, controls the tuning procedure. There is also automatic switching for the different video systems.

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. The type of this filter depends on the received standard(s). There are two SAW filters: one for filtering picture-IF and a second one for sound-IF. An extra filter (5403), tuned at 40.4 MHz, is necessary for L/L' sets (with 6.5 MHz sound), to suppress the neighbour channel.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 62 of the HIP to pin 1 of the tuner. AGC take-over point is adjusted via the service alignment mode 'Tuner AGC'. If there is too much noise in the picture, it is possible that the AGC setting is wrong. It is also possible that the AGC-setting is mis-aligned, if the picture deforms with a perfect signal. Then the IF-circuit amplifies too much.

The video IF-signal is fed to pins 2/3 of the PLL-controlled IF-demodulator. The voltage-controlled oscillator of the PLL is adjusted via the service menu 'IF AFC'. If the alignment is correct, the displayed frequency in the installation menu is the same as the applied frequency from a generator. The external coil L5408 connected between pins 7/8 is used as reference.
The demodulated IF-video signal is available at pin 10 of the HIP. In this video signal, there is a rest of the sound carrier, which is filtered out by the sound trap 1407.
Then the signal is again fed to the HIP on pin 12, where the group delay is corrected, dependent on the standard that is received.
The CVBS-signal is available at pin 13 for further processing in the set. Via TS7322, the signal is supplied to EXT1 (monitor out) and again back into the HIP (pin 14) to the source/record selection.

To realise Quasi Split Sound (QSS), the IF-signal is fed to the HIP on pin 63/64 via SAW-filter 1405. The FM (or AM for L-norm) modulated signal is available on pin 5 and is fed to the audio demodulator MSP34xx (7651).

9.6 Video: High-end Input Processor (HIP, Diagram B2)

In the EM5E, the HIP TDA932xH is used, which contains the following functions:

- IF demodulation.
- Group delay correction.
- AFC signal generation, used to track drifting transmitters.
- Sound carrier re-generation (SIF).
- AM demodulation.
- Sync acquisition, delivering HA, and VA.
- Switching off IF-filtering.

9.6.1 Inputs

The HIP has various inputs:

- Full matrix switch with:
  - Two CVBS inputs.
  - Two Y/C (or additional CVBS) inputs.
  - One CVBS front-end input.

- Two RGB inputs and two status-inputs.

The input signals from the Front I/O are fed to the HIP, and front detection is fed to the OTC.

- EXT1 is full SCART: thus CVBS and RGB/YUV. The RGB-selection is done in the HIP.
- EXT2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB. EXT2 has also the possibility for Y/C_in and Easylink-Plus (P50). Y_in is with pin 20 and Chroma_in with pin 15. Easylink is handled via pin 10 of the SCART and this is a bi-directional communication.
- EXT3 is meant for RGB and CVBS input only.

9.6.2 Outputs

One can select three, separate switchable, outputs:

- One YUV-output, which is fed to the PICNIC.
- Two CVBS outputs, one for Teletext Dual Screen, and the other for output to EXT2 to have WYSIWYR (What You See Is What You Record).

9.6.3 I/O Switching

The external signals are fed directly to the I/O part of the HIP with status from pin 8 of SCART. On the HIP, there are two status inputs available (pins 15, 17) with two voltage levels:
4:3 -> 2.2 V.
16:9 -> 5.5 V.

9.6.4 P50

EasyLink features are based on the 'one touch operation' approach. This means that a sequence of actions are executed at the same time in both the television and the video cassette recorder, provided both are fitted with the EasyLink function and connected with the eurocable supplied with your video recorder.

Easylink (P50.1) supports the next features:

- Signal quality and aspect ratio matching.
- One touch play.
- One touch text.
- Pre-set download.
- WYSIWYR.
- Automatic Standby.

With **Easylink-Plus** (P50.2) is added:

- Country and language installation.
- System Standby.
- NexTView download.
- Timer record control.
- VCR control feature.

Cinemalink (P50.3)
Cinema Link is a new Philips feature in which the TV, the audio receiver, and other video peripherals like DVD player and video recorder communicate with each other (on condition they all are equipped with the Cinema Link functionality and are connected via a SCART cable). They automatically offer the highest quality combination of picture and multi channel surround sound to create your own Home Cinema.
With one key on the remote control, with which you can control all Cinema Link products, your total Cinema Link system will be started and the DVD or video recorder will start to play and the audio receiver will provide the sound (on the condition Cinema link is enabled) on behalf of the TV.
The TV can function as the centre speaker of your system, making a separate centre speaker unnecessary.
By pressing the standby key on the remote control for at least 3 seconds, the complete Cinema Link system will be switched to standby.

9.6.5 Video Processing

The sandcastle-pulse, created by the HIP, is not used for synchronisation (only for the Comb filter). The HOP will generate synchronisation signals derived from the feature box (PICNIC, pin 60 and 61) signals.
If a VCR is connected, there is also an automatic correction for MacroVision (r). This is active for the external sources and the pre-sets 0, 90-99.
The HIP itself (no external voltage) controls the Y/C switch in the HIP.
The chrominance decoder in the HIP is full multi-standard: PAL/SECAM/NTSC.

Different crystals can be connected to the pins 54 to 57 without any alignment. The crystals are also used as a reference for the synchronisation. A digital control circuit that is locked to the reference signal of the colour decoder determines the start-up of the sync.
Note: You may only replace these crystals by the original ones. If just a crystal is taken, the internal capacitance will be different and the effect will be that there is no colour.

In the HIP a sync separation circuit is integrated; the HIP delivers the H_{A50} and V_{A50} to the PICNIC.

9.7 Video: Feature Box 7 (Diagram L)

The objective for this chassis was, to reach a sharper picture by means of a higher definition.
This is achieved via the so-called 'Pixel Plus' feature. So, what exactly is Pixel Plus?

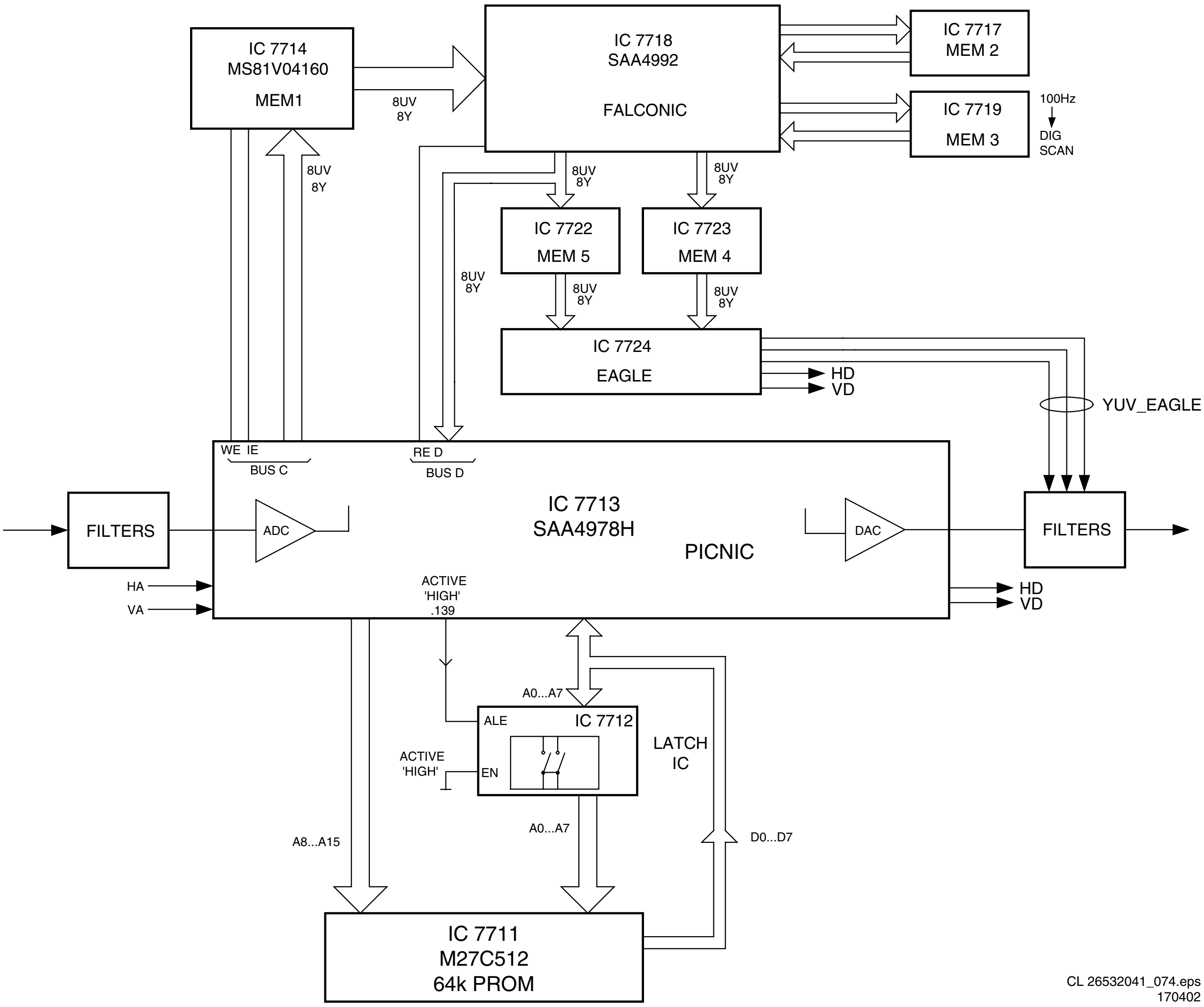
9.7.1 Introduction

The basic function of the Feature box (FBX) is picture improvement, and depending on the version, several scan conversion methods are possible. The PICNIC (SAA4978H) is the central key component.
In the EM5E-chassis, the feature-box is integrated on the SSB.

In the Feature Box 7 (FBX7), a new IC is used, called the 'Eagle'. This IC does the following picture improvements:

- **Horizontal:** increases from 840 to 1680 pixels per line (the number of pixels is doubled per line). This, by itself, does not mean an improvement in definition however. To achieve that, the new pixels are digitally processed inside the Eagle with Luminance Transient Improvement (LTI) and Peaking. This will give the new pixels extra picture information, which results in steeper slopes and contrast improvement at details.
- **Vertical:** increases from 625 lines (PAL) to 833 lines. Also, those new lines are processed inside the Eagle with LTI and Peaking, again resulting in lines with extra picture information.
- The **line frequency** is fixed on 31250 Hz and the **frame frequency** at 75 Hz (this will give no frame-flicker). In addition, other modes, like 'Digital Scan' are still possible.
- The colour enhancement features of the TOPIC are done by the Eagle.

9.7.2 Block diagram


IC 7714
MS81V04160
MEM1
IC 7718
SAA4992
FALCONIC
IC 7717
MEM 2
IC 7719
MEM 3
100Hz
DIG
SCAN
8UV
8Y
IC 7722
MEM 5
IC 7723
MEM 4
IC 7724
EAGLE
HD
VD
YUV_EAGLE
WE IE
BUS C
RE D
BUS D
FILTERS
ADC
IC 7713
SAA4978H
PICNIC
DAC
FILTERS
HA
VA
ACTIVE
'HIGH'
.139
HD
VD
A0...A7
ALE
IC 7712
LATCH
IC
ACTIVE
'HIGH'
EN
A0...A7
A8...A15
D0...D7
IC 7711
M27C512
64k PROM

CL 26532041_074.eps
170402

Figure 9-10 Block diagram FBX7

The 50 Hz YUV signals, coming from the HIP, are fed to the PICNIC via an anti-aliasing filter.
The (AABB) frame frequency doubling is done by the PICNIC (SAA4978, 160 pins QFP) together with a field memory (MEM1). This IC can handle most 100 Hz functions (except Progressive Scan).
The PICNIC has an internal CPU and a (small) integrated ROM. The actual FBX7 software is located in an external ROM (item 7711). In order to limit the number of connections between the PICNIC and the external ROM, a number of lines are used twice. The lines A8 to A15 are fixed lines, while the lines A0 to A7 are made switchable with the eight data lines of the ROM. This is done via a Latch (item 7712), which is controlled by pin 139 of the PICNIC (the ALE signal).
Via bus 'C', a digitalised signal is presented to FM1 (Field Memory 1), which is used for the 50 to 100 Hz conversion. The signal goes further via the data-bus to the FALCONIC. This IC has the following functions:

- Line flicker reduction.
- Digital Noise Reduction (DNR).
- Progressive scan (262.5 - 525 or 312.5 - 625 lines per frame).

At the end, the digital YUV signals enter, via FM4 and FM5, the Eagle IC.
This IC has the following functions:

- Luminance Transient Improvement (LTI).
- Peaking.
- Programmable number of lines.
- Programmable number of pixels per line.
- Demo mode (split screen).
- Improved colour transients (CTI) and colour enhancement (TOPIC).
- Improved vertical zoom.

The digital YUV-signals from the Eagle go, via a passive output filter, to the HOP.

9.7.3 PICNIC/FALCONIC (Diagram B3a and B3b)

The PICNIC is used for the 100Hz conversion and has the following functions:

- The ADC.
- The DAC.
- The 100 Hz conversion.
- Dual screen compression
- The Panorama mode.
- Automatic Aspect Ratio Adaptation (AARA)
- Colour Transient Improvement (CTI)
- The contrast improvement (Dynamic Contrast).

All these functions are integrated in one IC: SAA4978H, 160 pins QFP

ADC/DAC

- Analogue to Digital conversion is done with three identical 9-bit ADCs.

- Digital to Analogue conversion uses three identical 10-bit DACs.

In the PICNIC there are three nine bits ADCs present for Y, U, and V. For digitising the Y (luminance), nine bits are used (to realise a more detailed picture). These nine bits are only internally used. Via dithering, the nine bits are reduced to eight bits and this data is stored into memory. The data in the memory is fed back to the PICNIC and via un-dithering the data is again reproduced to nine bits for processing.
U/V (colour difference signals) is also sampled with nine bits. These two nine bit data streams are multiplexed to four bits data streams. As the perception for colours by the human eye is less sensitive as for luminance, this reduction is allowed.

100 Hz Conversion
The main task of the PICNIC is the conversion from 50Hz to 100Hz for YUV and HV-sync. In order to remove 'large area flicker' (especially visible in a white picture), the field-rate of the video is doubled by the FBX6. A 50/60 Hz frame frequency is converted to 100/120 Hz. In addition, the line frequency (16 kHz) is doubled (32 kHz).
Basically, when the video input contains fields A, B etc., the conversion provides an AABB sequence on the display. The actual conversion is done in the first Field Memory (by reading it twice at double speed, while writing it once.

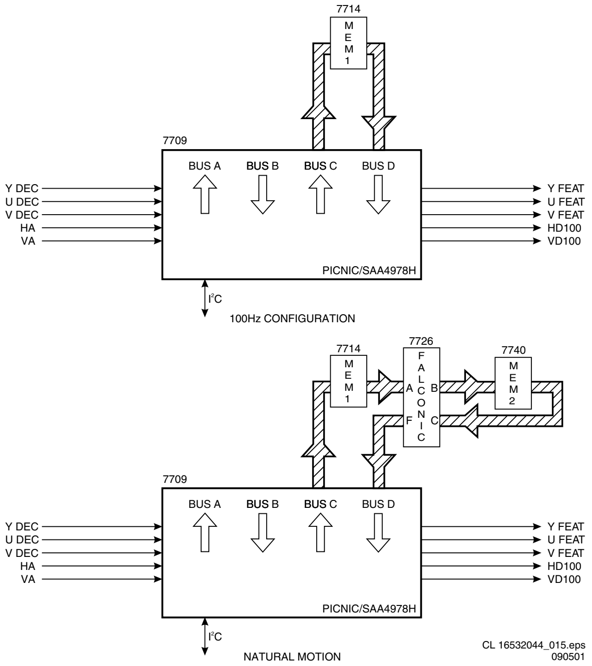


Figure 9-11 100 Hz conversion

For extra 100 Hz features, it is possible to add an extra IC to the PICNIC. This IC, called the 'Field And Line CONverter IC' (FALCONIC), has three modes:

- **100 Hz** (to eliminate field flicker). Only one memory IC (7714) is used to store one frame. It displays an AABB sequence.
- **Digital Scan** (to additional eliminate line flicker). Together with two memory ICs (7714 and 7740), it displays an AA'BB' or ABAB sequence.
- **Natural Motion** (to additional eliminate movement juddering). Together with two memory ICs (7714 and 7740), it displays an AB'A'B sequence.

Further features of the PICNIC:

- **Dual Screen Compression.** The PICNIC can provide horizontal video compression up to 50 %. The compress mode can be used to display dual screens with Teletext (only for wide-screen sets).
- **The Panorama Mode.** To fit 4:3 pictures into a 16:9 display, it is possible to apply a panoramic horizontal distortion, to make a screen-fitting picture without black sidebars or lost video. The centre horizontal gain is programmable and the side gain is automatically adapted to make a screen-fit.
- **Automatic Aspect Ratio Adaptation (AARA).** This feature uses data from the 'black bar detection circuit' to adapt the vertical and horizontal amplitude to an aspect ratio belonging to the display, without the black bars.
- **Colour Transient Improvement (CTI).** At CVBS video signals, the bandwidth of colour signals is limited to 1/4 of the luminance bandwidth. Transients between areas of different colours are therefore not very sharp. The PICNIC can steepen these transients artificially with a time manipulation algorithm.
- **Dynamic Contrast.** To make the contrast (black/white) range wider, Philips has invented Dynamic Contrast. It uses the digital memory used in 100 Hz sets. It measures every A-field (25 x per second), and digitally analyses where on the greyscale most of the image is located. If it is a relatively dark image, the lighter part of that image is stretched towards white, so that more contrast will become visible in that picture. If it is a relatively light image, the darker part of that image is stretched towards black, so that these darker parts will have more contrast. When the image is in the middle of the greyscale, both dark and light parts are stretched.

9.7.4 Eagle (Diagram B3c)

Introduction
Some strong picture improvements are carried out inside the Eagle, which all contribute to the excellent picture quality. These improvements are:

- LTI (both horizontal and vertical).
- CTI (only horizontal).
- Peaking (both horizontal and vertical).
- More pixels per line.
- More lines per frame.
- Better colour transitions.

By means of over sampling, the video signals get a sample frequency of 64 MHz, a bandwidth of 20 MHz, and 1680 pixels per line (was 32 MHz, 10 MHz and 840 pixels/line). This requires two extra field memories (MEM4 and MEM5).

The Eagle can handle four different modes:

- Digital Natural Motion (PAL): 100 Hz, 2fH, 2:1 Interlace (1680 pixels x 625 lines)
- Pixel Plus (PAL): 75 Hz, 2fH, 2:1 Interlace (1680 pixels x 833 lines)
- Double Lines (PAL): 50 Hz, 2fH, 2:1 Interlace (1680 pixels x 1250 lines)
- Pixel Plus (NTSC): 60 Hz, 2fH, 2:1 Interlace (1680 pixels x 1050 lines)

LTI (Luminance Transient Improvement)
The main objective of LTI is a steeper slope at contrast transitions (e.g. from 10 mV to 900 mV within 3 pixels i.s.o. 5 pixels for one detail). It is based on waveform altering around a signal jump.

Important: The LTI, as used in the Eagle, is designed for interpolated picture contents. This means that for pixel/line doubling, one of the two pixels/lines is an interpolated value. When a picture jump is interpolated, you will get extra room to make it steeper (you get extra pixels to describe the slope). Without interpolation, you cannot use this kind of LTI.

- LTI can add 'ears' to the waveform at the jump (a kind of controlled overshoot).
- LTI 'estimates' the frequency of the jump and will adapt the amplification to this frequency.
- LTI is applied both horizontal as vertical.

- LTI is amplitude dependent. This means that only 'big' jumps are processed. It works with a threshold, which is coupled to the noise meter via the Auto TV software.
- LTI is also frequency dependent. This means that it is distributed over the slopes. When there are many steep slopes in the signal, LTI will only process the steepest ones. If there are only a few slopes, LTI will process all of them. This is fully hardware implemented.

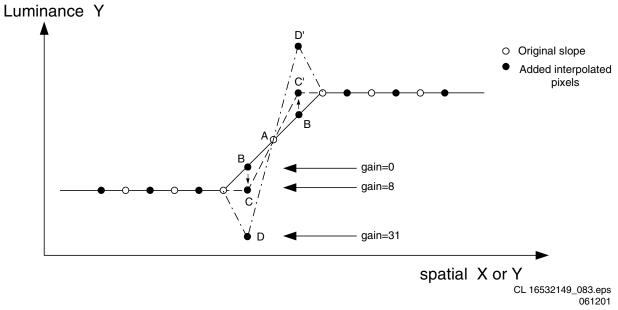


Figure 9-12 Horizontal LTI

For horizontal LTI, the number of pixels is doubled (64 MHz) by means of interpolation. Pixel A at the transition will keep its luminance value, while the (new) pixels B can have a luminance value of zero to max. 31. For example:

- Pixels B can keep the same value (gain = 0)
- Pixels B can get the value of C and C' (gain = 8), which will give a steeper slope.
- Pixels B can also get the value of D and D' (gain = 31), which will give an even steeper slope with the so-called 'ears'. These 'ears' will give a **contrast** improvement.

For CTI, the same principle is used, in order to get better **colour** transitions.

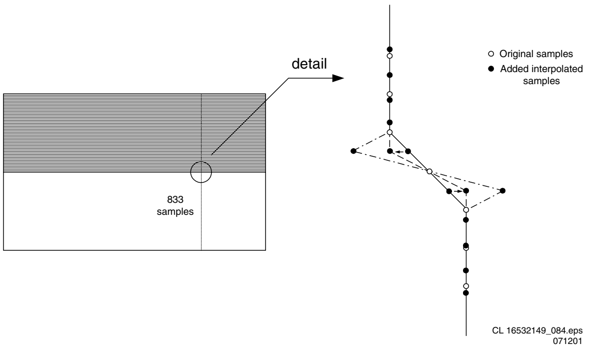


Figure 9-13 Vertical LTI

The principle for vertical LTI is the same as for horizontal LTI. The shift from 625 to 833 lines is done by means of a scaler. With these extra interpolated samples, it is possible to create steeper slopes, possibly with 'ears'.

Peaking/Coring

The objective of 'peaking' is contrast improvement (e.g. from 50 mV_{PP} to 70 mV_{PP} for one detail).
It uses a noise threshold (coring = non-linear filtering around zero-level), thus it works everywhere in the picture (except below the threshold level).
The added difference signal is frequency dependent, which results in frequency dependent contrast improvement. When the difference signal becomes too large, the peaking is reduced (smartness).

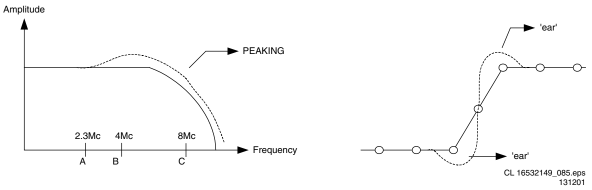


Figure 9-14 Peaking

To obtain above shown filter characteristic, filters are set at three parameters (see A, B, and C). In this way, only the higher frequencies are 'lifted'. After sending the luminance signal through these filters, the filter output is added to the original signal. In this way, the so-called 'ears' are created, together with the steeper slopes. These 'ears' will give a **contrast** improvement at details.

Both horizontal and vertical peaking is **amplitude dependent**: the higher the signal jump, the lower the peaking. This is done to avoid that high jumps get big 'ears', because this will introduce nasty contouring. To avoid peaking on noise levels, coring is used. The coring threshold is set via the Auto TV software, by means of the noise meter.
Therefore, the result is that **only details** are processed by the peaking.

The horizontal peaking is also **frequency dependent**: it is possible to perform peaking around three frequencies (when combined, it is even possible to peak at variable frequencies). In Auto TV, this feature is software coupled to the sharpness meter, in order to get the most optimal filter characteristic. The vertical peaking works on a fixed frequency.

Colour Enhancements

In the FBX6 (as used in the EM3E), the TOPIC handled the colour enhancement features, such as: 'skin tone correction', 'blue stretch', and 'green enhancement'. In the new FBX7, all this is done by the Eagle IC.

Output

The YUV signals presented to the HOP come from the Eagle. These three signals have all the same circuitry so it is explained once (for Y).

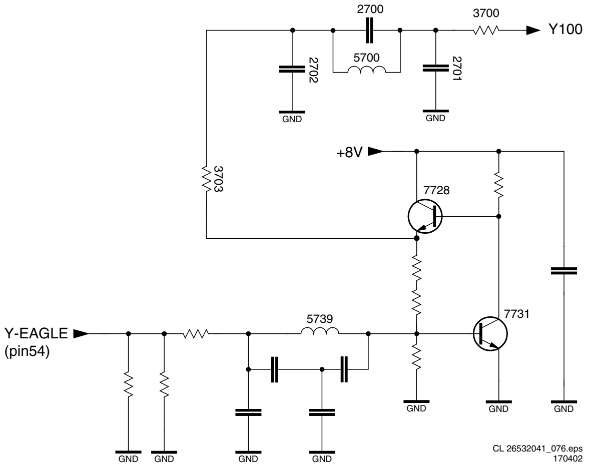


Figure 9-15 YUV Output Filter

The YUV signals are first filtered by a 64 MHz passive filter (L5739 with C's). Because the output signals from the Eagle are too small to drive the HOP directly, they are amplified by the circuit around TS7731 and TS7728. The gain is determined by R3791, R3788, and R3807. For the Y-signal the gain is 2, for the U-signal it is 1.33, and for the V-signal it is 1.05.

9.8 Video: High-end Output Processor (HOP) and TOPIC (diagram B4)

9.8.1 General

The YUV-signals from the PICNIC are fed to the HOP (High-end Output Processor, TDA9330). The video and geometry control parts are integrated in the HOP. Also the RGB-signals for TXT/OSD (from the P) are inserted via the HOP. The geometry part delivers the H-drive, EW-drive, V-drive, and also a drive signal for rotation.

The main functions of the HOP are:
- Video control (contrast, brightness, saturation, etc.).
- Deflection drive.
- Second RGB interface for OSD/TXT.
- Peak White Limiting.
- Cut-off control and White Drive (RGB outputs).
- Geometry control.

The TOPIC (The most Outstanding Picture improvement IC, item 7302, type TDA9178) is an **optional** IC between the PICNIC and the HOP. It has the following (picture improvement) functions:
- Luminance Transient Processor (LTP), for detail enhancement.
- Chrominance delay circuitry, to compensate timing differences between Y and C.
- Spectral processor, for improved sharpness and colour transient improvement (CTI).
- Colour vector processor, for skin tone correction, green enhancement and blue stretch.
- Measure and detection circuitry, for AutoTV.

The sandcastle pulse from the HOP is fed to pin 1 of the TOPIC, which is used as reference for timing.

9.8.2 Video Control

After source selection, the HOP controls the signals for Saturation, Contrast, and Brightness. Output is RGB again.

9.8.3 OSD/TXT Control

On pins 35 to 38, the RGB and fast blanking from the OTC (OSD and TXT) are inserted. The sync signal V_{SYNC} is derived from the 'FRAMEDRIVE-" signal.

9.8.4 Peak White Limiting

On pin 43 there is a Peak White Limiting signal line (PWL). If the beam current increases, the 'EHT-info' voltage will decrease. Average limiting via R3343/C2333 controls PWL.

9.8.5 Cut-off Control

The following will happen when you switch the TV to Standby:
1. The vertical scan is completed.
2. The vertical flyback is completed (the horizontal output is gated with the flyback pulse, so that the horizontal output transistor cannot be switched 'on' during the flyback pulse).
3. The 'slow stop' of the horizontal output is started, by gradually reducing the 'on' time at the horizontal output from nominal to zero (this will take 50 ms).
4. At the same time, the fixed beam current is forced via the black-current-loop for 25 ms. This is done by setting the RGB outputs to a maximum voltage of 5.6 V.

In the EM5E a 'one-point' cut-off control is used:
A current of 8 μA (for cut-off) is fed to pin 44 of the HOP. This is done with a measurement pulse during the frame flyback. During the first frame, three pulses are generated to adjust the cut-off voltage at a current of 8 μA. With this measurement, the black level at the RGB-outputs is adjusted. Therefore, at start-up there is no monitor pulse anymore. At start-up, the HOP measures the pulses, which come back via pin 44. The RGB-outputs have to be between 1.5 V and 3.5 V. If one of the outputs is higher than 3.5 V or one of them lower then 1.5 V, the RGB-outputs will be blanked.

9.8.6 Geometry control

All geometry control is done via I^2C and the data is stored in the NVM (IC7011) of the SSB.

9.8.7 Deflection Control

Line Drive
The Line drive is derived from an internal VCO of 13.75 MHz. As a reference, an external resonator is used (1301). The internal VCO is locked with the HD_{100}-pulse, which comes from the PICNIC.
The 'PHI-2' part in the HOP receives the HFB_X-RAY_PROT (pin 13) to correct the phase of the Line drive. The EHT-info is supplied to pin 14 (DYN-PHASE-CORR) to compensate picture breathing depending on the beam current.

Frame Drive
At pins 1 and 2, the symmetrical frame drive signals are available. The V_{SYNC} signal, for synchronisation of the OSD/TXT, is derived from the 'FRAMEDRIVE-' signal.

East/West Drive
At pin 3, the E/W drive signal is available. Pin 4 is a feedback input for the EHT-info, and is used to prevent pumping of the picture. The EHT varies also dependent on the beam current. E.g. for wide-screen without load this is 31.5 kV and with load (1.5 mA) 29.5 kV.

Frame Rotation
For frame rotation, a control voltage is used from pin 25 of the HOP. Frame rotation is only used in wide-screen sets.

9.8.8 Protections

Flash detection
When a flash occurs, the EHT-info will become negative very fast. Via R3316, D6304, and D6303, TS7303 starts to conduct. This makes pin 5 of HOP 'high'. The output (pin 8) is immediately stopped.
If the H-drive stops, then also pin 5 will become 'low' again, which will reset the flash detection.
A bit (FLS) is set in an output status register, so that the OTC can see that there was a flash. This FLS-bit will be reset when the OTC has read that register.

HFB protection
If the HFB is not present, this is detected via the HOP. The OTC puts the set into protection and reads a register in the HOP. An error code is generated.

9.9 Synchronisation (Diagram B2, B3 & B4)

The HIP video processor provides the vertical and horizontal sync pulses V_{A50} and H_{A50}. They are synchronised with the incoming CVBS signal. Then these pulses are fed to the PICNIC, where they are doubled to be synchronous with the 100 Hz picture. The outgoing pulses, V_{D100} and H_{D100}, are fed to the HOP, which supplies the vertical and horizontal drive pulses and the 100 Hz (2fH) sandcastle pulse.

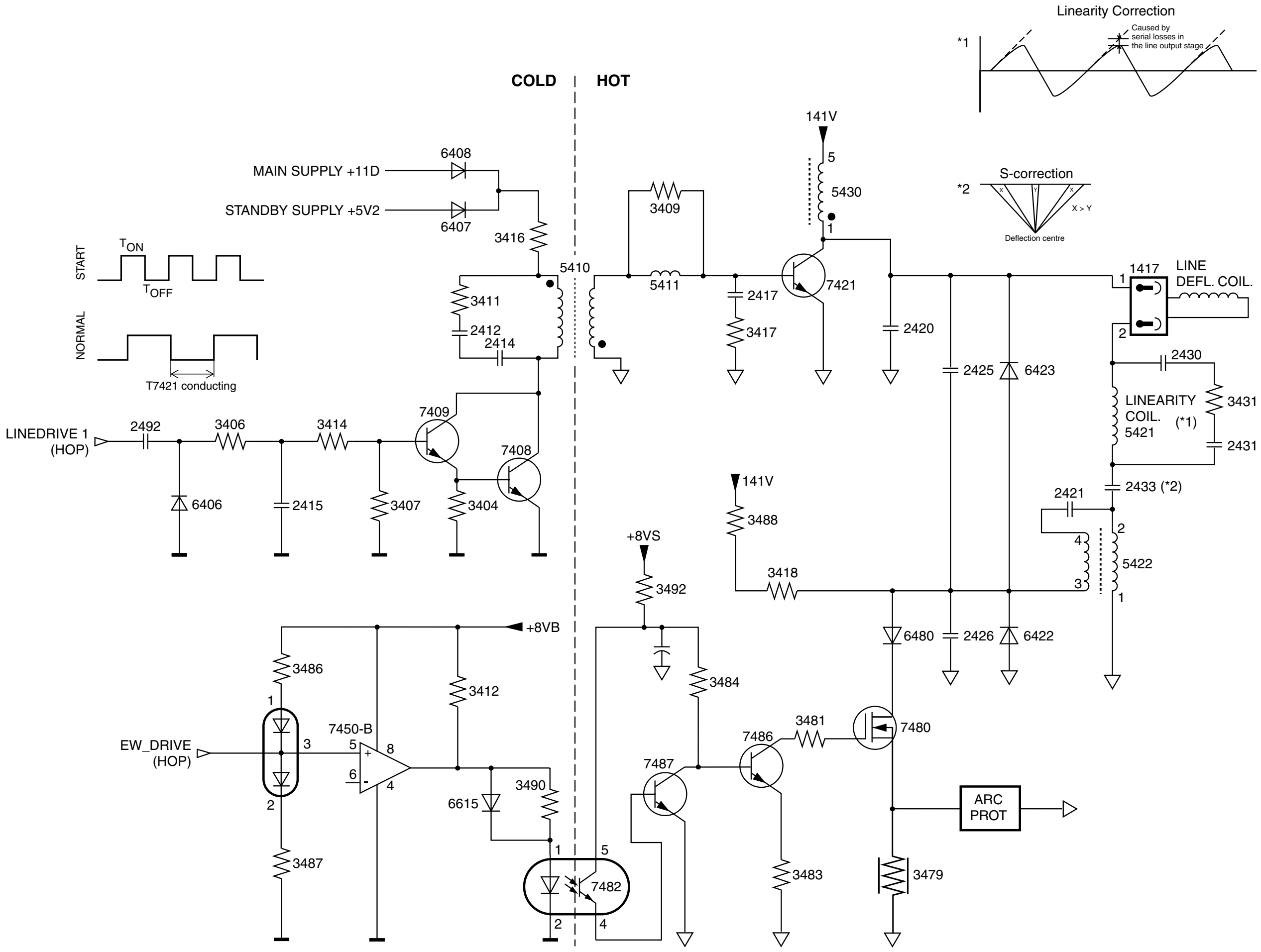
The V_{D100} pulse from the PICNIC is inverted by TS7304 to the V_D signal. The OTC is synchronised on the HFB pulse from the

CRT and on the V_{SYNC} from the HOP, for the synchronisation of TXT/OSD/EPG

When no CVBS is offered to the video processor, the V_{A50} and H_{A50} pulses are switched 'off' by the HIP, and the pulses are generated by the PICNIC (to assure a stable OSD).

9.10 Horizontal (Line) Deflection (Diagram A3)

9.10.1 Principle



Linearity Correction
*1
Caused by serial losses in the line output stage
COLD
HOT
141V
5
5430
1
*2
S-correction
X > Y
Deflection centre
6408
MAIN SUPPLY +11D
STANDBY SUPPLY +5V2
6407
3409
3416
START
TON
TOFF
NORMAL
T7421 conducting
5410
5411
2417
7421
1417
LINE DEFL. COIL.
3411
2412
2414
3417
2420
2425
6423
2430
LINEARITY COIL. 5421
(*1)
3431
2431
7409
7408
LINEDRIVE 1 (HOP)
2492
3406
3414
6406
2415
3407
3404
141V
3488
+8VS
3492
3418
2433 (*2)
2421
4
3
2
5422
1
+8VB
3486
3412
3484
6480
2426
6422
EW_DRIVE (HOP)
7450-B
5
8
6
4
3
2
6615
3490
7487
7486
3481
7480
ARC PROT
3487
7482
1
5
2
4
3483
3479

CL 26532041_077.eps
170402

Figure 9-16 Line deflection circuitry

The HOP (located on the SSB) generates the line-drive pulses (LINEDRIVE1), which have a frequency of 31250 Hz (T = 32 µs).

When the LINEDRIVE1 signal is high, TS7409 and TS7408 will conduct. A constant DC voltage will be applied across L5410, causing a linear increasing current through this coil. The secondary voltage of L5410 has a negative polarity so that TS7421 will block.
When the set is switched 'on', the current through L5410 is supplied by the 5V2 Standby supply (via D6407), and taken over by the +11D voltage (via D6408) of the main supply.

When the LINEDRIVE1 signal becomes low, TS7409 and TS7408 will block. The voltage polarity across the primary winding of L5410 will invert. The positive voltage on the secondary winding will now drive TS7421 into conductivity. Because of the storage time of the line transistor (TS7421), L5410 cannot transfer its energy immediately to the secondary side. This may result in high voltage peaks on the collector of TS7409 and TS7408. To prevent that these peaks will damage the transistors, a 'snubber' circuit (C2414, C2412 and R3411) will suppress them.

When the LINEDRIVE1 signal is high again, the above described sequence starts again. Circuit L5411 and R3409 will increase the switch 'off' time of the line transistor.

The line stage is started via a 'slow start' principle. During start-up, the HOP generates line drive pulses with a small T_{ON} and a high frequency (50 kHz). T_{OFF} is constant and T_{ON} is gradually increased until the frequency is 31250 Hz (normal condition). The time interval from start to normal condition takes about 150 ms.
When switching off, the same procedure is followed, but now in reverse order.

9.10.2 Implementation

To explain the operation of the line output stage, we use the following start conditions:

- C2433 is charged to max. 141 V (V_{BAT})
- TS7421 is driven into conductivity.

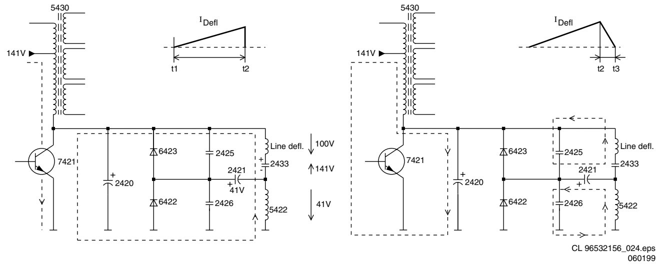


Figure 9-17 Line deflection part 1

- **Period t1-t2:** When TS7421 is driven into conductivity, the capacitor voltage of 141 V will be divided across bridge-coil L5422 and the deflection coil (connector 0317). Due to the chosen inductance values, there will be 100 V across the deflection coil and 41 V across L5422. The linear increasing current in the deflection coil will result in a spot moving from the centre of the picture tube to the right. The voltage across L5422 will also charge C2421 (41 V - 0.7 V).
- **Period t2-t3:** At the moment the LINEDRIVE signal becomes high, TS7421 will stop conducting. In the coils a voltage will be induced, trying to maintain the current. The current through the line deflection coils continues to flow through C2425 and C2421 and the current through L5422 continues to flow through C2426 and C2421. The energy stored in the line deflection coil is passed to C2425, and the energy of L5422 to C2426. The resonance-frequencies of these two LC-circuits define the flyback time of the spot from the right side of the picture tube to the left. On average, no current flows through C2421 and thus the voltage across this capacitor remains constant.

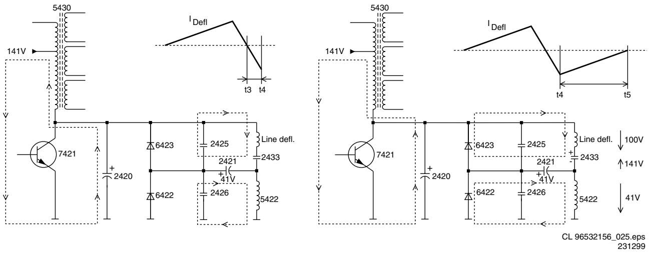


Figure 9-18 Line deflection part 2

- **Period t3-t4:** As for the period t2-t3; but now the current flows in the opposite direction, since the voltage across C2425 and C2426 is higher than the voltage across C2433 and C2421.
- **Period t4-t5:** The coils want to maintain the negative current and will charge the capacitors negative. Because of this, D6422 and D6423 will conduct. The voltage is 100 V across the deflection coil and 41 V across L5422. As both diodes conduct, we may consider the voltage constant. A linear current flows with the same changing characteristics as in period t1-t2. The spot now moves from the extreme left of the picture tube to the centre. Before the current becomes zero, and the spot is located in the centre of the frame, TS7421 reverts into conductivity. First a short negative current will flow. The cycle starts again.

9.10.3 Corrections

Several corrections are necessary to obtain a correct picture.

Linearity Correction

A constant voltage across the horizontal deflection coil should result in a linear increasing saw-tooth current. This is not the case however, as the resistance of the coil is not negligible. In order to compensate for this, a re-magnetised coil L5421 in series with the deflection coil is used. This coil ensures that during time interval t1-t3 the circuit resistance will be higher than during t4-t5.
L5421 is called the linearity coil. To avoid self-oscillation, R3431 and C2431 are placed parallel to L5421.
See also Figure 9-9 item '*1'.

S-correction

Since the sides of the picture are further away from the point of deflection than the centre, a linear saw-tooth current would result in a non-linear image (the centre would be scanned slower than the sides).
To solve this, the deflection current for the right- and left side is reduced.
C2433 is charged quadratic during time interval t1-t2. Left and right the voltage across the deflection coil decreases, causing the deflection to slow down. In the centre, the voltage increases and the deflection will be faster.
An S-shaped current is superimposed on the saw-tooth current. This correction is called 'finger-length correction' or 'S-Correction'.
C2433 is relatively small, as a result of which the saw-tooth current will generate a parabolic voltage with negative voltage peaks. The current also results in a parabolic voltage across C2421, resulting in the finger-length correction, proportionally increasing with the picture width.
The EW-DRIVE signal will ensure the largest picture width in the centre of the frame. Here the largest correction is applied. The larger the picture width, the higher the deflection current through C2433.
See also Figure 9-9 item '*2'.

E/W-correction

A line, written at the upper- or lower side of the screen, will be larger at the screen centre when a fixed deflection current is used. Therefore, the amplitude of the deflection current must be increased when the spot approaches the screen centre. This is called East/West correction.

The EW drive signal originates in the HOP and is supplied to TS7480 via OpAmp 7450-B and optocoupler TS7482. The shape of this signal determines the various geometric correction parameters:

- H amplitude
- EW-parabola
- EW-corner
- EW-trapezium
- Horizontal parallelogram
- Horizontal bow

TS7480 will charge capacitor C2421 more or less, increasing the deflection current when reaching the centre of the screen. The moment TS7480 is driven into saturation, C2421 will discharge during the flyback. As a consequence of which C2421 must be charged again during the scan via the conduction diode D6422 (as long as C2421 is not charged to the voltage across L5422, D6422 will conduct).
The current in the deflection coil is therefore larger than the current flowing in L5422 (1-2). The voltage across the deflection coil increases, so the picture width increases. When TS7480 blocks, C2421 will not discharge anymore, and the voltage across C2421 will remain constant.
The result is that the voltage across the deflection coil is minimal. The voltage across coil L5422, however, is maximal. This coil (L5422) consists of a transformer with the following properties:
As the current through the coil 1-2 increases (smaller picture width), the current through coil 3-4 decreases. Because of the transformer characteristic a higher voltage will be subjected to coil 3-4, which will counteract the current. The current will diminish even further.
When the current through coil 1-2 diminishes (larger picture width), the current through coil 3-4 increases.

Beam-current Correction

The 'EHT-info' signal at point 10 of the LOT depends on the value of the beam-current and the voltage from divider R3450, R3451, and C2450. This signal is fed to the HOP to trim the contrast, and to compensate for the changes in picture-width as a function of the EHT-info, when EHT is decreased.
The 'EHT-info' is also used to correct the EW-current.

The 'DYN-FASE-CORR' signal, derived from the 'EHT-info' signal, is fed to the HOP via C2455 and drives a dynamic phase correction necessary because of beam-current variations. This is done by regulating T_{ON} of the line transistor TS7421.

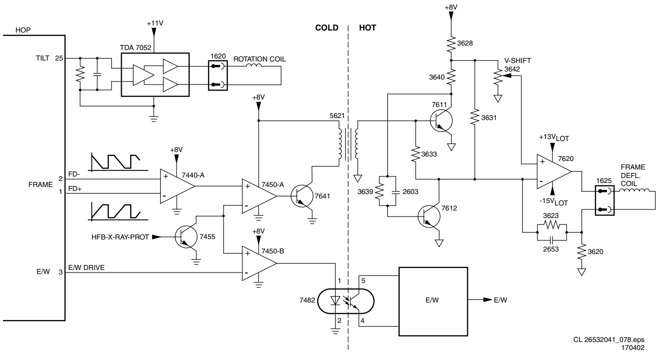
9.10.4 Secondary Line Voltages

During the blocking time of TS7421, the magnetic energy of coil 1-5 of the LOT is transferred to electrical energy in the secondary winding. Via rectifying and smoothing, the several secondary supply voltages are generated, like:

- EHT, Focus and Vg2-voltage.
- +200V for the CRT panel (pin 8 LOT).
- +11D for the line deflection (pin 12 LOT).
- +13V-LOT for the frame deflection (pin 6 LOT).
- -15V-LOT for the frame deflection (pin 3 LOT).
- Filament voltage (pin 9 LOT).

9.11 Vertical (Frame) Deflection (Diagram A4)

9.11.1 Frame Stage Drive



CL 26532041_078.eps
170402

Figure 9-19 Frame deflection circuitry

The HOP drives the frame output stage with a symmetrical saw-tooth voltage. As the HOP is 'cold' and the frame output stage is 'hot', they are galvanic isolated. This is done via a transformer (5621). As in the MG-chassis, the HOP generates three signals needed for the frame output stage: FRAMEDRIVE+, FRAMEDRIVE- and TILT (for rotation).
The rotation circuit is kept at the 'cold' side of the chassis, to avoid the costs an extra optocoupler.
The circuit around IC7440 will amplify this signal and the output current will flow through the rotation coil.

9.11.2 Flyback Generator

The frame output stage is supplied via the +13 V and -15 V coming from the LOT. The output of the amplifier is 0 V_{DC}, so a coupling capacitor is not required.

During the (forward) scan, a supply of +13 and -15 V is sufficient to respond to the slow changing current. The internal flyback generator puts a voltage of -15 V on pin 3. Because of the voltage drop over zener diode D6622 (8.2 V), C2622 will be charged to 19 V: being 13 + (15 - 8.2 - 0.7) V.
During the flyback scan, the change in current-per-time is much larger, so a higher voltage is required. The flyback generator will now generate a voltage of +13 V on pin 3. Added to the charge on C2622 this will give a flyback voltage of 32 V (depending on the CRT size, this value can differ).

The amplifier IC (IC7620, pin 5) supplies the saw-tooth current to the frame deflection coil. The current through this coil is measured via R3620//R3621//R3622 and fed back to the inverting input of the amplifier.
R3624 and C2624 on the output of the amplifier, form a filter for high frequencies and in that way also prevents oscillations. Peak voltages on the output, e.g. as a result of a possible flash, are damped by the clamp circuit consisting of D6619, C2627, and R3627. The network consisting of R3625, R3626, R3629, and C2629 form an extra damping circuit.

9.11.3 Anti-moiré circuit (Diagram B9)

Introduction

By shifting two following frames w.r.t. each other, it is possible to decrease the 'Moiré' effect. This is achieved by adding an extra current to the frame drive sawtooth.

For 50/75 Hz frame rates, the sequence is: one normal frame followed by one shifted frame.
For 100 Hz frame rates, the sequence is: two normal frames followed by two shifted frames.

Implementation

The circuit around TS7020 and 7019 (one shot timer) detects which frame rate is used.
The circuit around TS7017 and TS7018 (Flip-Flop) generates the extra current for the frame drive.

9.11.4 Protection circuits

Bridge Coil Protection

The secondary voltage of the bridge coil L5422 is guarded at the diode modulator (D6421/6422) via a 10 V zener diode (6499 on diagram A4). When the bridge-coil is working properly, the average voltage on D6422 is such that this zener diode will conduct. It will drive TS7652 into saturation.
When, for any reason, the secondary side of the bridge coil is shorted, the average voltage on D6422 will drop below the zener-voltage, and TS7652 will block. Now capacitor C2642 is charged. Transistor TS7407 starts conducting and the SUP-ENABLE signal is grounded via R3403. This will switch 'off' the main supply (see diagram A1).

Frame Output Protection

Via the circuit built around TS7641, the frame output stage is guarded. If the frame output stage is working properly, TS7641 and TS7652 will both conduct, and thereby discharge C2642. TS7443 is blocked, so the SUP-ENABLE signal is 'high'.
If there are frame pulses missing, TS7641 will block and capacitor C2642 is charged. Transistor TS7443 starts conducting and the SUP-ENABLE signal is grounded via R3403. This will switch 'off' the main supply (see diagram A1).

ARC Protection

If there are 'open' connections (e.g. bad solder joints) in the high-energy deflection circuitry, this can lead to damaging effects (read: fire). For that reason, the E/W current is sensed (via 3479//3480). If this current becomes too high, the 'thyristor' circuit (TS7653 and TS7654) is triggered. TS7442 is switched 'on' and TS7443 is forced into conduction. The 'SUP-ENABLE' signal is shorted now to ground level, which will force the Main Power Supply to Standby mode

9.12 Audio (Diagram B6, A6 & A7)

9.12.1 Introduction

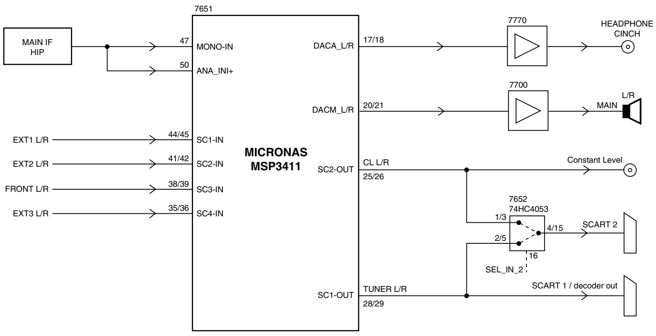
All EM5E sets contain one of ITT's Multi-standard Sound Processing (MSP) ICs for sound decoding. The diversity arises because each member of the MSP-family handles its own set of sound standards:

- MSP34x1: Virtual Dolby decoding.
- MSP34x2: Dolby ProLogic decoding.

Both versions also handle NICAM.

The MSP IC takes care of the main FM sound decoding. AM decoding for the L system is done by the HIP. The demodulated L sound is then again source selected and processed in the MSP. The reason for this is the bad AM detection performance of the MSP. However, in case of NICAM L, it is handled by the MSP.

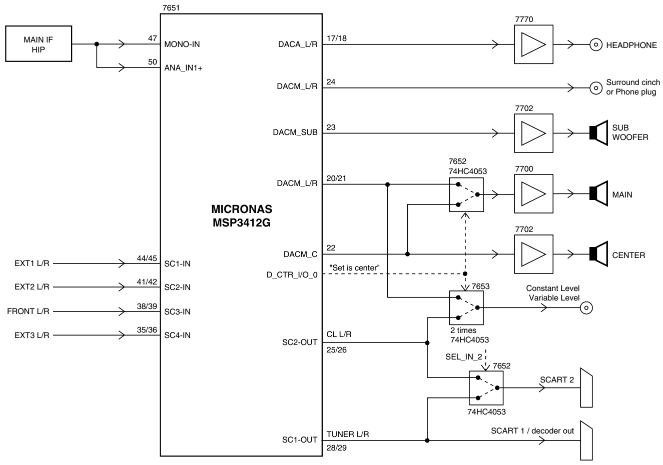
All MSP versions contain digital audio processing, used for the basic left/right stereo sound, such as bass, treble, balance, incredible sound and spatial.
In addition to that, both versions are capable of Dolby processing:
The MSP34x1can perform 'Virtual Dolby' processing (a Dolby approved sound mode for surround sound reproduction with left/right speakers only).


7651
MAIN IF
HIP
47
MONO-IN
50
ANA_INI+
EXT1 L/R
44/45
SC1-IN
EXT2 L/R
41/42
SC2-IN
FRONT L/R
38/39
SC3-IN
EXT3 L/R
35/36
SC4-IN
MICRONAS
MSP3411
DACA_L/R
17/18
7770
HEADPHONE
CINCH
DACM_L/R
20/21
7700
L/R
MAIN
SC2-OUT
CL L/R
25/26
Constant Level
7652
74HC4053
1/3
2/5
4/15
SCART 2
16
SEL_IN_2
SC1-OUT
TUNER L/R
28/29
SCART 1 / decoder out

CL 16532044_028.eps
140501

Figure 9-20 Virtual Dolby processing

The MSP34x2 can perform 'Dolby ProLogic' processing (left, right and (mono) surround).


7651
MAIN IF
HIP
47
MONO-IN
50
ANA_IN1+
EXT1 L/R
44/45
SC1-IN
EXT2 L/R
41/42
SC2-IN
FRONT L/R
38/39
SC3-IN
EXT3 L/R
35/36
SC4-IN
MICRONAS
MSP3412G
DACA_L/R
17/18
7770
HEADPHONE
DACM_L/R
24
Surround cinch
or Phone plug
DACM_SUB
23
7702
SUB
WOOFER
DACM_L/R
20/21
7652
74HC4053
7700
MAIN
DACM_C
22
7702
CENTER
D_CTR_I/O_0
"Set is center"
7653
Constant Level
Variable Level
2 times
74HC4053
SC2-OUT
CL L/R
25/26
SEL_IN_2
7652
SCART 2
74HC4053
SC1-OUT
TUNER L/R
28/29
SCART 1 / decoder out

CL 16532044_029.eps
140501

Figure 9-21 Dolby Pro Logic processing

The following amplifier configurations are possible:

- Virtual Dolby, L/R, 2 x 15 W (88XX-series and 8957-series with extra digital input).
- 3D Surround, L/R, Centre, Subwoofer, 4 x 15 W (95XX-series).

9.12.2 Inputs / Outputs

Both versions can cover four stereo inputs and one AM (mono) input. This means in practice: three SCART inputs, one side input, and one AM (mono) input.

Both versions have the following outputs: SCART1 (CVBS/decoder out), SCART2 (record select/WYSIWYR out) and headphone.

9.12.3 Source Selection

The constant level output to SCART2 is connected via a so-called 'Régimbeau' switch (IC7652) (see also Figure 9-13). This switch is needed to prevent acoustic feedback ('Larsen' effect). This effect is caused, when EXT2 is chosen as input signal, and the output of SCART2 is selected. This means that the main picture is also EXT2, which will cause the 'Larsen' effect.
To prevent this, the record select must be switched to 'Tuner'. This is especially important when decoders are used, behind a 'transparent' VCR connected to EXT2.

To get a constant level output if the Tuner is selected, the SCART1 output ('Tuner' at any time) has to be fed back to the input selector and selected as input for the MSP (SCART1 input).

The MSP34XX has a separate headphone output, so sound control can be done separate from the speakers.

9.12.4 Audio Decoding

At the input, a choice can be made between two IF-signals; SIF and SIFM.
The selected signal is fed to the AGC. After this, an ADC converts the IF-signal to digital.
Two demodulation channels can process this digital signal. The first one is able to handle FM and NICAM signals. The second one can handle FM and AM signals.
Each channel contains a mixer to shift the incoming signal in the frequency domain. This shift is determined by the value of a DCO.
After the down-mix, the signal is fed, via a filter, to a discriminator. From here the AM, FM or NICAM demodulation can be performed.
Both channels contain an 'automatic carrier mute' function, which automatically mutes the output of the analogue section when no carrier is detected.
After demodulation, the FM-signals are subjected to a de-emphasis operation. After that, the matrix of the stereo system is applied.

9.12.5 Audio Processing

The sound processing in EM5E is completely done by the MSP:

- Volume control is done by the user via the SOUND menu.
- Tone control in 'Stereo' sets is done via the BASS/TREBLE control, in 'Virtual Dolby' sets via the 5-band equaliser.
- Headphone control, the MSP has a separate Headphone output so separate sound control is possible.

Automatic Volume Levelling (AVL)
One of the features of the MSP-family is Automatic Volume Limiting (AVL). If used, it limits the big volume differences in the

broadcast between e.g. news transmissions and commercials, or within a movie.
To be able to get a Dolby approval (for the Virtual Dolby sets), the AVL feature must be switchable. Therefore, the AVL feature is customer switchable via the menu.

9.12.6 Audio Amplifier (Diagram A6)

The audio amplifier is an integrated 'class-D' power amplifier IC, the TDA7490. It delivers an output of 2 x 15 W_{RMS} to two full range speakers. For the higher specified sets, a subwoofer and centre speaker are easy to implement, by adding a second amplifier.

Principle
Audio-power-amplifier systems have traditionally used linear amplifiers, which are well known for being inefficient. In fact, a linear Class AB amplifier is designed to act as a variable resistor network between the power supply and the load. The transistors operate in their linear region, and the voltage that is dropped across the transistors (in their role as variable resistors) is lost as heat, particularly in the output transistors. Class D amplifiers were developed as a way to increase the efficiency of audio-power-amplifier systems.

The Class D amplifier works by varying the duty cycle of a Pulse Width Modulated (PWM) signal.
By comparing the input voltage to a triangle wave, the amplifier increases duty cycle to increase output voltage, and decreases duty cycle to decrease output voltage.
The output transistors of a Class D amplifier switch from full 'off' to full 'on' (saturated) and then back again, spending very little time in the linear region in between. Therefore, very little power is lost to heat.
If the transistors have a low 'on' resistance $R_{DS(ON)}$, little voltage is dropped across them, further reducing losses.

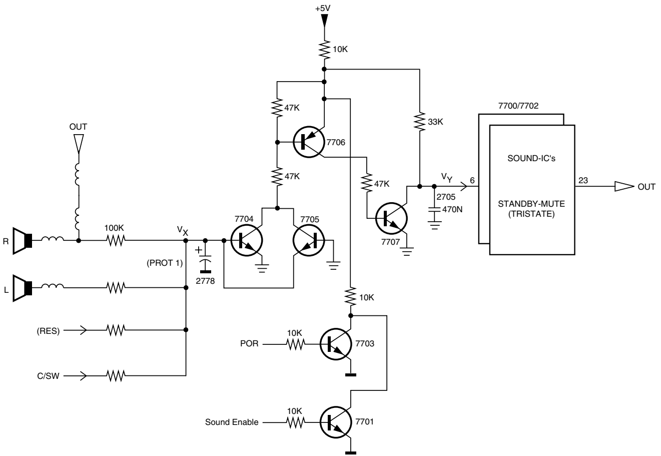
The advantage of Class D is increased efficiency (= less heat dissipation). Class D amplifiers can drive the same output power as a Class AB amplifier using less supply current.
The disadvantage is the large output filter that drives up cost and size. The main reason for this filter is that the switching waveform results in maximum current flow. This causes more loss in the load, which causes lower efficiency.
An LC filter with a cut-off frequency less than the Class D switching frequency (200 kHz), allows the switching current to flow through the filter instead of the load. The filter is less lossy than the speaker, which causes less power dissipated at high output power and increases efficiency in most cases.

The supply voltage is a symmetrical voltage of +/- 16 V (or +/- 19 V depending on the set execution), generated by the main supply via L5512 (or L5506).

Mute
Sound-mute is done via the STBY-MUTE line connected to pin 6 (tri-state input) of the amplifier IC. This line is activated via the SOUND-ENABLE line (software controlled) and/or POR line (hardware controlled).
This signal is inverted by TS7701 and/or TS7703, as a result of which at a high level of the SOUND-ENABLE signal, current is sinked from pin 2 and the IC mutes.

Protection
A loudspeaker DC protection is implemented. The amplifier IC TDA7490 has a 'standby-mute-play' feature via the tri-state input pin 6. When the voltage on pin 6 is:
- 0 - 0.7 V, the IC is in 'standby' mode
- 1.7 - 2.5 V, the IC is in 'mute' mode
- 4 - 5 V, the IC is in 'play' mode (normal operation).

Note: this is a 'local' protection, not known to the microprocessor.



CL 16532044_017.eps
140501

Figure 9-22 Loudspeaker DC-protection

This works as follows:
- During normal operation, V_X is 'low' (0 V) and V_Y is 'high' (+5 V).
- When a **positive** DC-voltage is detected on a loudspeaker output (= V_X), TS7704, TS7706, and TS7707 will conduct, making V_Y 'low'.
- When a **negative** DC-voltage is detected on a loudspeaker output (= V_X), TS7705, TS7706, and TS7707 will conduct, making V_Y also 'low'.
- When V_Y is '**low**' (read 0 V), the tri-state input (pin 6) puts the amplifier IC in 'standby' mode.

9.12.7 Headphone Amplifier (Diagram B10)

The headphone amplifier is a straightforward OpAmp amplifier (IC7681, NJM4556). It is supplied with +8 V.

9.12.8 Wireless Surround

A wireless surround-sound transmitter is obtainable as accessory. For diagrams and circuit description see Service Manual 'A10E-DPL' (order nr. 3122 785 10980).

9.13 Teletext and NexTView (Diagram B5)

9.13.1 Teletext

The TXT-decoder in the OTC gets its video signal directly on pin 5 (from the HIP).
The RGB-outputs are available on pins 77/78/79. Fast blanking is realised via pen 80.
The DRAM (IC7007) of the microprocessor is used for storage of the TXT pages.

9.13.2 NexTView

NexTView allows the user to display a program guide on the TV screen, which contains extensive information for each program (only when supported by the programs provider).

This information can be displayed in a number of different summaries:
- DAY: The daily summary shows, from the current moment, the program schedule for several stations for a short time ahead.
- CHANNEL: The channel summary shows the program schedule for one station.
- THEME: The theme summary shows, for each theme, the program schedule of the various stations. These themes

consist of sport, film, culture, etc. and are determined from the station side.

NexTView does not have to restrict itself to information about the station that is being viewed, but also offers information about other stations. In the various summaries, three different commands can be given for the various program overviews. These commands appear as follows:

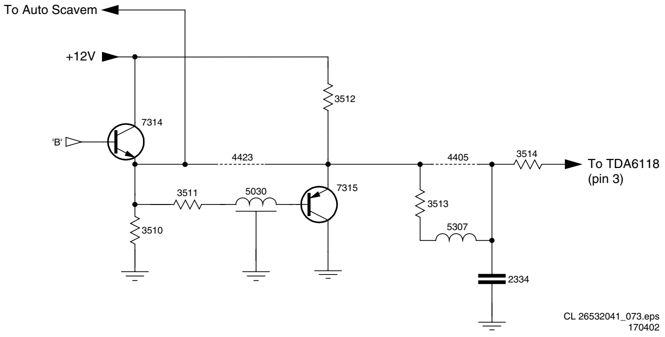
- WATCH: The set immediately switches over to the station concerned.
- REMINDER: The start time and date and the station of the program concerned are stored in the TV reminder list. The TV will give an OSD-message with the program information, or switch on the set at the correct moment (provided the set is in Standby) and tune to the station concerned.
- RECORD: The timer of the video recorder with 'Easylink Plus' is programmed with the data of the program concerned. There has to be a video recorder (with Easylink Plus) connected to SCART2 otherwise the 'RECORD' function will not be highlighted. The connection is via pin 10 from SCART. This means that it has to be a full SCART or at least pin 10 has to be wired.

In order to be able to realise NexTView, two teletext type data flows, Data stream 1 and 2, are transmitted with various sub-code pages of information. This data flow can transport limited information (max. 40 pages). Data stream 1 is quick repeating with a repetition time of approximately 20 to 30 seconds. However, Data stream 2 has a much longer repetition time of approximately half an hour and has a large transport capacity.

- Data stream 1 contains information of the station that is being viewed.
- Data stream 2 contains up to one week of advance information from various stations that are covered by the provider.

9.14 CRT Panel / Rotation

9.14.1 RGB Amplifiers (Diagram F1)



CL 26532041_073.eps
170402

Figure 9-23 (RG)B signal path

The RGB signals from the HOP are fed to three identical amplifiers (TDA6118) on the CRT panel. We take one of them (B, connector 1940 pin 9) as example for the description. After emitter follower TS7314, the signal is fed to TS7315. This emitter follower sends the signal, with the same DC-voltage, to the RGB amplifier (IC7350, pin 3). In order to cope with the higher definition, this IC has a larger bandwidth as the ones used in the EM3E. Via outputs 5, the cathodes of the picture tube are driven.
The supply voltage for the amplifiers is 200 V and is derived from the LOT.

9.14.2 Rotation (Diagram A5)

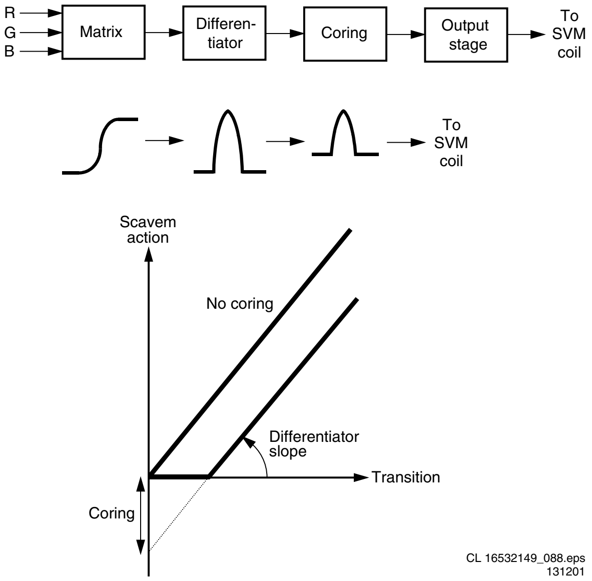
In sets with a rotation coil (wide screen sets), the amount of frame rotation is adjusted with the 'Tilt' DAC-output of the HOP pin 25 (see also 'Vertical Deflection').

9.15 Auto Scavem (Diagrams SC1 and F2)

9.15.1 Introduction

To improve the sharpness, the Scan Velocity Modulation (Scavem) circuit modulates the deflection speed as a function of the picture contents. This feature uses a separate Scavem deflection coil.
Auto Scavem is introduced, to be able to display the high definition signal from the FBX7. As the Scavem circuit is now controlled by the Auto TV software, it is called Auto Scavem. The circuit, with the Scavem amplifier, is located on a separate PWB (parallel to the SSB), and is connected to the picture tube panel.

9.15.2 Normal Scavem

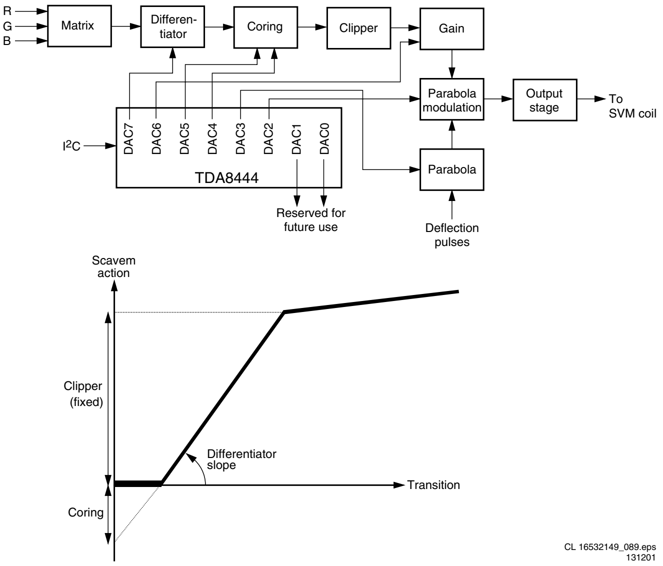


CL 16532149_088.eps
131201

Figure 9-24 Normal Scavem

With normal Scavem (as used in the EM3E), the RGB signals are added together and differentiated before they drive the Scavem coil. The coring block prevents that Scavem processing is done on low signal levels.

9.15.3 Auto Scavem (Diagram SC)


R
G
B
Matrix
Differentiator
Coring
Clipper
Gain
Parabola modulation
Output stage
To SVM coil
Parabola
I2C
DAC7
DAC6
DAC5
DAC4
DAC3
DAC2
DAC1
DAC0
TDA8444
Reserved for future use
Deflection pulses
Scavem action
Clipper (fixed)
Differentiator slope
Transition
Coring

CL 16532149_089.eps
131201

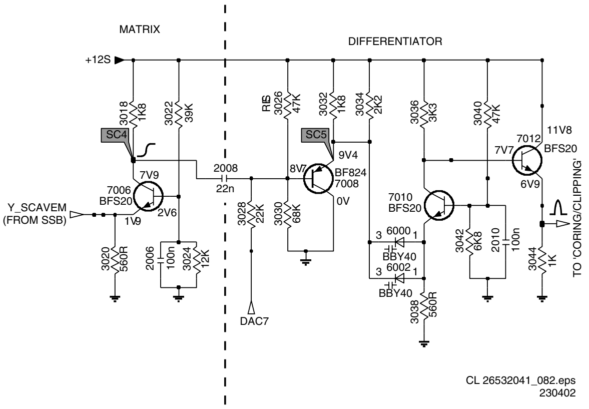
Figure 9-25 Auto Scavem

This new Auto Scavem circuit include some extra blocks:

- Clipper
- Parabola modulation

Auto Scavem is fully software controlled, by means of I^2C. The speed, at which Auto Scavem is adapted, is controlled by the Auto TV algorithm. This adaptation takes place together with the FBX initialisation, and takes about 1 second. The different circuit stages are controlled via a DAC (item 7500, TDA8444). The new Auto Scavem circuitry also produces higher Scavem currents, which results in sharper pictures. For the circuit description, we splitted the circuit in eight stages.

Matrix and Differentiator


MATRIX
DIFFERENTIATOR
+12S
3018 1K8
3022 39K
SC4
7V9
7006 BFS20
2V6
1V9
Y_SCAVEM (FROM SSB)
3020 560R
2006 100n
3024 12K
2008 22n
3028 22K
DAC7
3026 47K
3032 1K8
SC5
9V4
8V7
BF824 7008
0V
3030 68K
3034 2K2
3036 3K3
7010 BFS20
6000
BBY40
6002
BBY40
3038 560R
3040 47K
3042 6K8
2010 100n
7012 BFS20
11V8
7V7
6V9
3044 1K
TO 'CORING/CLIPPING'

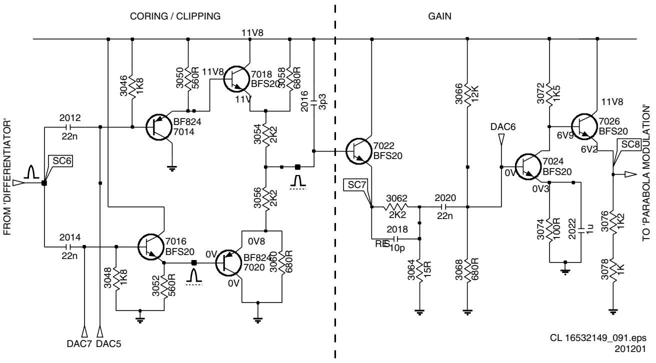
CL 26532041_082.eps
230402

Figure 9-26 Auto Scavem: Stage 1 and 2

The 2fH RGB signals are added on the SSB (see diagram B4), and presented to the emitter of transistor 7006.

The next circuit is the differentiator. The combined signal enters this circuit at the base of transistor 7008. The DC-level of this transistor is controlled by the DAC7 line, which is dependent of the 'sharpness meter' reading in the Auto TV algorithm. By means of this control signal, the voltage and capacity of varicap diode 6000 is altered, which will adapt the differentiator.
The slope of the differentiator is controlled by this DC-level. The differentiation itself is done by varicap diode 6000. Output signal goes from the collector of transistor 7010 via emitter follower (= buffer) 7012, to the next stage.

Coring/Clipping and Gain


CORING / CLIPPING
GAIN
11V8
FROM 'DIFFERENTIATOR'
SC6
2012 22n
2014 22n
BF824 7014
7016 BFS20
7018 BFS20
BF824 7020
DAC7
DAC5
SC7
7022 BFS20
3062 2K2
2020 22n
2018 10p
DAC6
7024 BFS20
7026 BFS20
SC8
TO 'PARABOLA MODULATION'

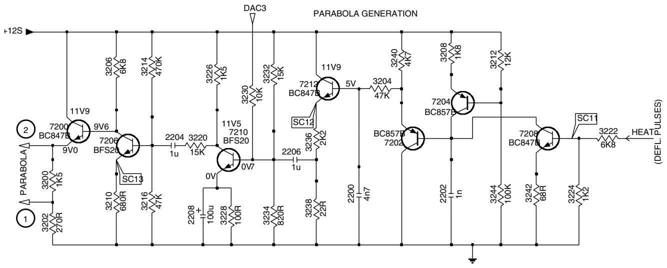
CL 16532149_091.eps
201201

Figure 9-27 Auto Scavem: Stage 3 and 4

The coring circuit (items 7014 and 7016) prevent Auto Scavem on the lowest signal levels (= noise), while the clipper circuit (items 7018 and 7020) always give the same amount of Scavem above a certain level.
The levels at which this must happen, are controlled by the DAC4 and DAC5 lines, and are dependent of the 'noise meter' reading in the Auto TV program.

The input signal enters this circuit at emitter follower 7022, and is strongly attenuated via voltage divider R3062 and R3064. This, because the gain of transistor 7024 is set with the adjustable voltage divider of R3066, R3068 and R3070. The level at which this happen, is controlled by the DAC6 line, and is dependent of the 'sharpness meter' reading in the Auto TV program, the picture tube size, and the sharpness setting by the customer.

Parabola Generation(optional)

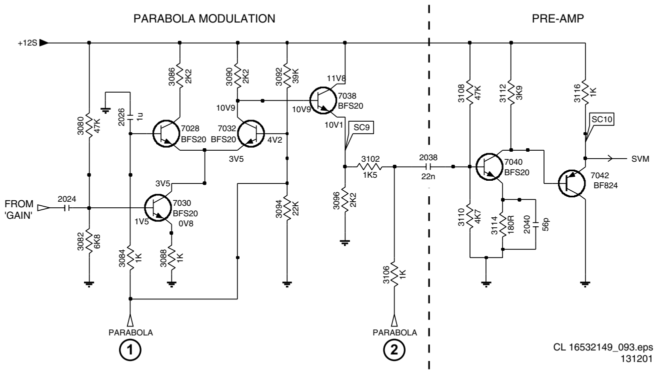

DAC3
PARABOLA GENERATION
+12S
PARABOLA
SC13
SC12
SC11
7200 BC847B
7206 BFS20
7210 BFS20
7212 BC847B
7204 BC857B
7202 BC857B
7208 BC847B
HEATER
(DEFL PULSES)

CL 16532149_092.eps
201201

Figure 9-28 Auto Scavem: Stage 5

Optional (depending on the set execution), the Scavem signal is modulated with a parabola. This is necessary, because the picture tube is less sensitive for Scavem in the centre as on both sides.
On the CRT-panel, the 'heater' pulses are used to create a parabola on line frequency. This parabola is made with transistors 7204 and 7206. The DC-level of these transistors is controlled via the DAC3 line. In this way, you can control the parabola via software. The level is dependent of the 'sharpness meter' reading in the Auto TV program, the picture tube size, and the sharpness setting by the customer.

Parabola Modulation and Pre-amplifier


PARABOLA MODULATION
PRE-AMP
+12S
3080 47K
2026 1u
3086 2K2
3090 2K2
3092 39K
11V8
7038 BFS20
10V9
10V9
10V1
SC9
7028 BFS20
7032 BFS20
4V2
3V5
3V5
FROM 'GAIN'
2024
7030 BFS20
1V5
0V8
3082 6K8
3084 1K
3088 1K
3094 22K
3096 2K2
3102 1K5
2038 22n
3106 1K
3108 47K
3112 3K9
3116 1K
SC10
7040 BFS20
7042 BF824
SVM
3110 4K7
3114 180R
2040 56p
PARABOLA
①
PARABOLA
②

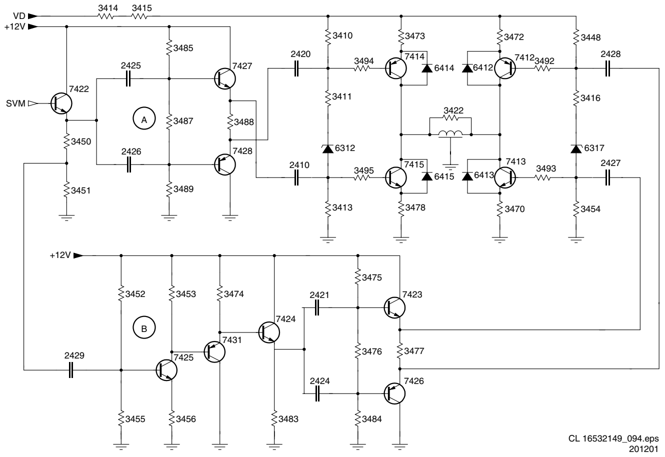
CL 16532149_093.eps
131201

Figure 9-29 Auto Scavem: Stage 6 and 7

The Scavem signal enters at the base of transistor 7030. Transistors 7028 and 7032 are complementary. Normally, the same current goes through both components, but because on one of them (7028) the parabola signal is offered, the Scavem signal is now modulated and inverted.
After buffer 7038, the parabola signal is again added to the (now inverted) signal, so that only the modulated signal is available on the input of the pre-amplifier (items 7040 and 7042).

Pre-amplification is done via a voltage amplifier (7040) and an emitter follower (7042).

Final Amplifier (Diagram F2)


VD
+12V
3414
3415
3410
3473
3472
3448
3485
2420
3494
7414
6414
6412
7412
3492
2428
2425
7427
7422
SVM
3411
3416
A
3487
3488
3422
3450
2426
7428
6312
6317
2410
3495
7415
6415
6413
7413
3493
2427
3451
3489
3413
3478
3470
3454
+12V
3475
3452
3453
3474
2421
7423
B
7424
7431
3476
3477
2429
7425
2424
7426
3455
3456
3483
3484

CL 16532149_094.eps
201201

Figure 9-30 Auto Scavem: Stage 8

Note: Above figure is taken from the MG3.2E chassis manual, and so can deviate slightly from the EM5E execution. However the principle is for both chassis the same.

Finally, the Auto Scavem signal arrives, via emitter follower 7422, at stage [A] on the CRT panel. Transistors 7427 and 7428, together with power transistors 7414 and 7415, form the power amplifier, which can deliver the high Scavem currents. From the emitter of 7422, a signal is taken for stage [B]. This signal is **inverted** by transistor 7425 and buffered by 7431 and 7424. The next stage is identical to that of stage [A].
At a positive alteration of the Scavem signal, transistors 7427 and 7415 in stage [A] will conduct, while 7428 and 7414 are blocked. In stage 'B', the positive pulse is inverted, so transistors 7426 and 7412 will conduct, while both 7423 and 7413 are blocked. The Scavem current will flow now, via transistor 7412, through the Scavem coil and then through 7415.
During negative alterations, the current will flow through transistor 7414, the Scavem coil, and transistor 7413.

9.16 Software Related Features

Following features are described:

- Auto TV
- 'Switch On' Behaviour

9.16.1 AutoTV

The AutoTV (or 'Automatic Picture Control' or 'Active Control') aims at giving the customer the best possible picture performance at any time. It is a collection of algorithms that control the image processing parameters, depending on the picture properties retrieved from meters or information in the main software.

The following sub-systems are defined for Auto-TV. They are present or absent, according to the hardware configuration of the set.

- **Auto Noise Reduction.** This algorithm measures the amount of noise in the incoming video signal (this is done by the LIMERIC part of the PICNIC). As a result of this measurement, the amount of noise in the picture is corrected, starting from that noise level which is annoying for the customer. Which parameters exactly can be used is depending on the hardware.
- **Auto Sharpness.** This algorithm measures the amount of sharpness via the bandwidth of the incoming video signal and adapts the peaking frequency in the PICNIC according to this info. If the 'sharpness meter' sees the video content as 'sharp', high frequency peaking will be used. On the other hand, if the picture content is seen as 'not sharp', a low/mid frequency peaking is used.
- **Auto Ambient.** The picture performance is adapted to the ambient conditions (via the light sensor).
- **Auto Colour.** This is saturation control with colour features (TOPIC/Eagle).

Notes:

- There is a coupling between the Auto Noise and the Auto Sharpness algorithm: if noise is present in the video content, then in general the sharpness will be made less aggressive. Special care has to be taken to the interaction of the LIMERIC and the vertical peaking of the PICNIC: a too big amount of vertical peaking increases the visibility of the 2DNR artefacts.
- Most algorithms are located in the embedded processor of the PICNIC, because of time-critical calculations, and because most picture analysing and correction circuits are present in the PICNIC. Some parts of the algorithms are located in the main software, because the outcome needs to be send to other I^2C devices.

9.16.2 'Switch On' Behaviour

Below find the start up sequence:

1. After the power is applied, the 'Standby supply' starts oscillating, generating the +5V2 (and +3V3). A reset (POR) is generated and the OTC is awakened.
2. Next step is the check whether the set needs to be in 'Standby' mode or not. Therefore, the NVM content is read and the Standby-bit is checked. If the set is to stay in Standby, there is no further action.
3. If the set will switches 'on', first the degaussing will be activated (12 seconds).
4. Meanwhile the MSP is reset and the Standby line is pulled low, leading to a full semi standby mode (5 V and 8V switched on)
5. The OTC waits until the +5V and the +8 V are fully present. This is done by checking the AD-input of the OTC. The +5V, +8V, and I^2C protection-algorithms are activated.
6. The HOP is instructed via the I^2C-bus to start the drive.
7. Via the SUP-ENABLE signal, the main supply is activated. The Line Deflection circuitry is supplied now with the V_{BAT}, and the EHT generation can start.

8. During start-up of the deflection, I^2C traffic must be disabled for 250 ms to avoid data corruption. If flashes or spikes are generated during EHT start-up, I^2C data could be disturbed or corrupted.
9. After deflection is powered up completely, all the other protection-algorithms are activated.
10. The black current stabilisation loop in the HOP is switched on. Some extra checking is done to ensure that the loops are completely stabilised.
11. The OTC sets all the necessary parameters for a correct sound and image and unblanks the picture.

9.17 Abbreviation list

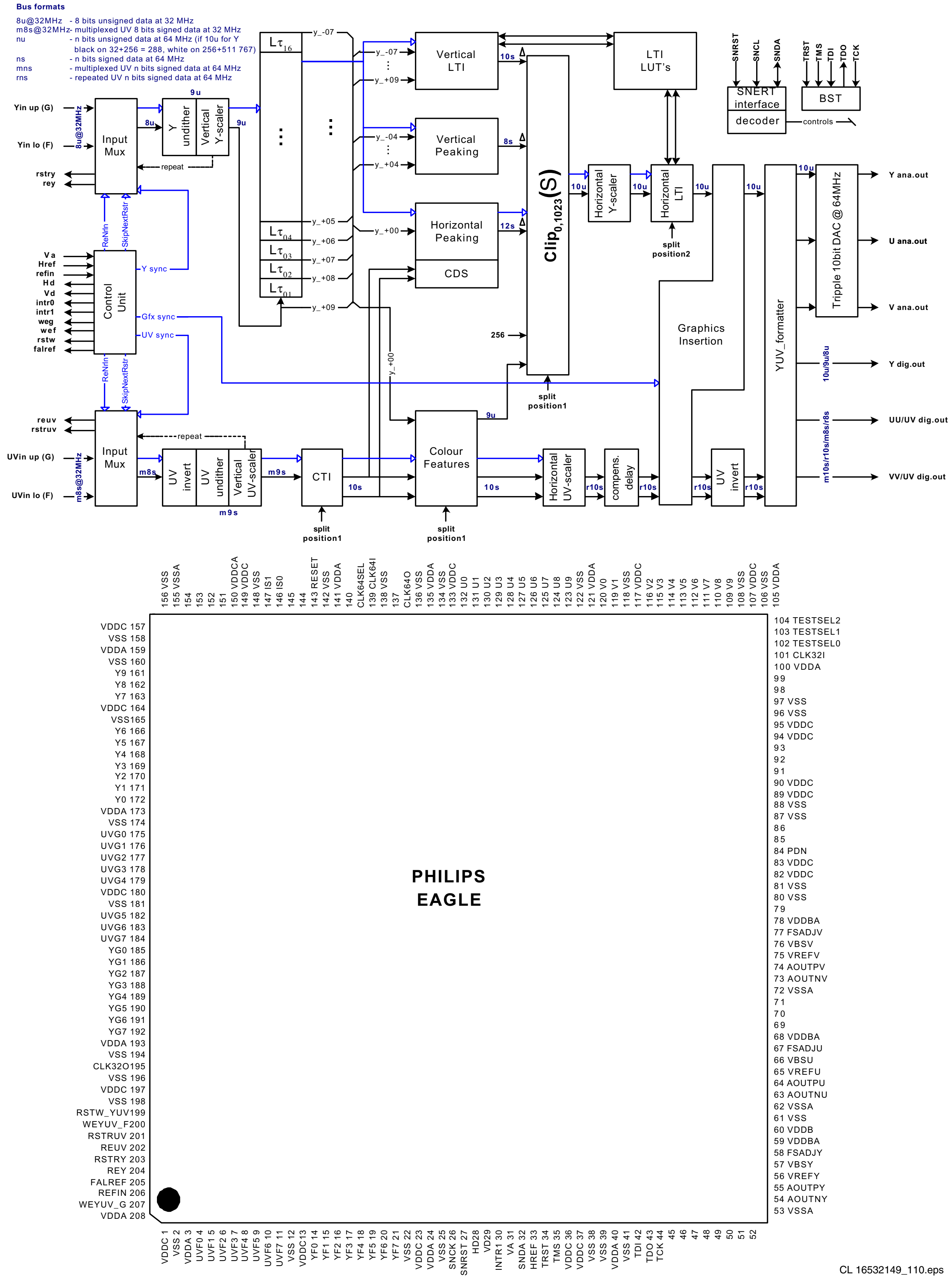
2DNR	Spatial (2D) Noise Reduction
3DNR	Temporal (3D) Noise Reduction
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeping up the original aspect ratio
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature-box
AM	Amplitude Modulation
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV
AR	Aspect Ratio: 4 by 3 or 16 by 9
Artistic	see OTC 2.5: main processor
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars but without throwing away video information
ATV	See Auto TV
AUDIO_C	Audio Centre
AUDIO_L	Audio Left
AUDIO_R	Audio Right
AUDIO_SL	Audio Surround Left
AUDIO-SR	Audio surround right
AUDIO_SW	Audio Subwoofer
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
BC-PROT	Protection signal to the uP for a too high Beam Current.
BG	System B and G
BLC-INFO	Black Current Info
B-SC1-IN	Blue SCART1 in
B-SC2-IN	Blue SCART2 in
B-TXT	Blue teletext
CL	Constant Level: audio output to connect with an external amplifier
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronisation
CVBS-TER	CVBS terrestrial
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DC-filament	Filament supply voltage
DFU	Direction For Use: description for the end user
DNR	Digital Noise Reduction: noise reduction feature of the box
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
DYN-FASE-COR	Dynamic phase correction, to correct the phase of the H-drive
Eagle	Feature box IC performing peaking, zooming and sub pixel LTI in both horizontal and vertical direction, CTI and other colour features
EHT	Extra High Tension
EHT-INFO	Extra High Tension information, used for contrast reduction, vertical and horizontal amplitude correction, beam current protection, and flash detection.
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTView)
EW	East West, related to horizontal deflection of the set
EW-DRIVE	The drive signal for the EW-transistor
EXT	External (source), entering the set via SCART or via cinches
FALCONIC	SAA4992H, feature box IC performing Digital Natural Motion, 3DNR, and vertical zoom and vertical peaking
FBL	Fast Blanking: DC signal accompanying RGB signals
FBL-PIP	The fast blanking signal for PIP
FBL-TXT	The fast blanking signal for TXT. It has a higher priority than FBL-PIP
FBSCO	Fixed Beam Current Switch Off, a 140 V dip detection to activate the black switch off circuit
FBX	Feature Box: part of small signal / separate module which contains 100 Hz processing, extra featuring and AutoTV algorithms (FBX6= based on PICNIC, FBX7= based on PICNIC and Eagle)
FDS	Full Dual Screen
FILAMENT	Filament of CRT
FLASH	Flash memory
FM	Field Memory or Frequency Modulation
G-TXT	Green teletext
GND-DRIVE	A separate ground for the line-drive towards the line driver
H_{A50}	Horizontal Acquisition 1fh: horizontal sync pulse coming out of the HIP
H_{D100}	Horizontal Drive 2fh: horizontal sync pulse coming out of the feature-box
HD@HOME	A signal from the OTC, to switch the HOP to the Pixel Plus standard (75 Hz frame)
HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection
HIP	High-end video Input Processor (TDA9320): video and chroma decoder of EM5E
HOP	High-end video Output Processor (TDA9330): video, sync, and geometry controller of EM5E
HP	Headphone
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in 'pairs', causing line flicker
I^2C	Integrated IC bus

IF	Intermediate
I/O	Input/Output
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes
LDP	Line Deflection Protection signal, derived from the EW-current and voltage
LED	Light Emitting Diode
LINE-DRIVE	Line drive signal (for the Line transistor)
LNA	Low Noise Adapter
LSP	Large signal panel
MSP	Multi-standard Sound Processor: ITT sound decoder of EM5E
MUTE	Mute-Line
NC	Not Connected
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
O/C	Open Circuit
ON/OFF LED	On/Off control signal for the LED
OSD	On Screen Display
OTC	On screen display Teletext and Control; also named Artistic (SAA5800)
P50	Project 50 communication: protocol between TV and peripherals
PCB	Printed Circuit Board
PICNIC	Peripheral Integrated Combined Network IC (SAA4978): main IC for 100 Hz featuring and feature processing
PIP	Picture In Picture
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
PTP	Picture Tube Panel
RAM	Random Access Memory
R-TXT	Red teletext
RC	Remote Control
RC5 / RC6	Signal protocol from the remote control receiver
RESET	Reset signal
RGB-PIP	RGB-input for PIP
RGB-TXT	RGB-input for Teletext and OSD
RGB-VC	RGB-input to the Picture Tube Panel
ROM	Read Only Memory
SAM	Service Alignment Mode
SC	Sandcastle: two-level pulse derived from sync signals
S/C	Short Circuit
SCAVEM	Scan Velocity Modulation
SCL-F	Clock signal on fast I2C bus
SD	Standard Definition
SDA-F	Data signal on fast I2C bus
SIF	Sound Intermediate Frequency
SIMM	80-fold connector between LSP and SSB
SNERT	Synchronous No parity Eight bit Reception and Transmit
SSB	Small Signal Board
STBY	Standby
SW	Subwoofer
TXT	Teletext
TXT-DS	Teletext Dual Screen
TXT-KILL	To kill the TXT picture to insert a PIP. It has a higher priority than FBL-TXT.
µP	Microprocessor
U_{100}	U from Feature Box
V_{100}	V from Feature Box
V_{A50}	Vertical Acquisition 1Fh
V_{BAT}	Main supply for deflection (mostly 141 V)
V_{D100}	Vertical Drive 2fh: vertical sync pulse from deflection
VDPOS	One of the symmetrical drive signals for the DC frame output stage.
VDNEG	One of the symmetrical drive signals for the DC frame output stage.
VFB	Vertical Flyback Pulse: vertical sync pulse coming from the feature box
VL	Variable Level out: processed audio output towards external amplifier
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
X-RAY-PROT	A protection signal for too high X-ray radiation
XTAL	Quartz crystal
Y_{100}	Y from Feature Box
Y-OUT	Luminance-signal to HOP IC
YUV-Feat	The YUV input for the main picture, coming from the Feature box or the HIP

9.18 IC Data Sheets

In this paragraph, the internal block diagrams and pinning are given of ICs that are drawn as a 'black box' in the electrical diagrams (with the exception of 'memory' and 'logic' ICs).

9.18.1 Diagram B3c, T8F24EF (IC7724)


Bus formats
8u@32MHz - 8 bits unsigned data at 32 MHz
m8s@32MHz - multiplexed UV 8 bits signed data at 32 MHz
nu - n bits unsigned data at 64 MHz (if 10u for Y black on 32+256 = 288, white on 256+511 767)
ns - n bits signed data at 64 MHz
mns - multiplexed UV n bits signed data at 64 MHz
rns - repeated UV n bits signed data at 64 MHz
Yin up (G)
Yin lo (F)
8u@32MHz
Input Mux
rstry
rey
8u
Y undither
Vertical Y-scaler
9u
repeat
ReNfrn
SkipNextRstr
Va
Href
refin
Hd
Vd
intr0
intr1
weg
wef
rstw
falref
Control Unit
Y sync
Gfx sync
UV sync
reuv
rstruv
UVin up (G)
UVin lo (F)
m8s@32MHz
m8s
UV invert
UV undither
Vertical UV-scaler
m9s
CTI
10s
split position1
Lτ16
Lτ04
Lτ03
Lτ02
Lτ01
y_-07
y_+09
y_-04
y_+04
y_+05
y_+06
y_+07
y_+08
y_+00
Vertical LTI
Vertical Peaking
Horizontal Peaking
CDS
Colour Features
10s
8s
12s
Δ
Clip0,1023(S)
256
split position1
9u
LTI LUT's
Horizontal Y-scaler
Horizontal LTI
split position2
10u
Graphics Insertion
Horizontal UV-scaler
compens. delay
UV invert
r10s
YUV_formatter
Tripple 10bit DAC @ 64MHz
Y ana.out
U ana.out
V ana.out
10u/9u/8u
Y dig.out
m10s/r10s/m8s/r8s
UU/UV dig.out
VV/UV dig.out
SNRST
SNCL
SNDA
SNERT interface
decoder
TRST
TMS
TDI
TDO
TCK
BST
controls
156 VSS
155 VSSA
154
153
152
151
150 VDDCA
149 VDDC
148 VSS
147 IS1
146 IS0
145
144
143 RESET
142 VSS
141 VDDA
140
CLK64SEL
139 CLK64I
138 VSS
137
CLK64O
136 VSS
135 VDDA
134 VSS
133 VDDC
132 U0
131 U1
130 U2
129 U3
128 U4
127 U5
126 U6
125 U7
124 U8
123 U9
122 VSS
121 VDDA
120 V0
119 V1
118 VSS
117 VDDC
116 V2
115 V3
114 V4
113 V5
112 V6
111 V7
110 V8
109 V9
108 VSS
107 VDDC
106 VSS
105 VDDA
VDDC 157
VSS 158
VDDA 159
VSS 160
Y9 161
Y8 162
Y7 163
VDDC 164
VSS165
Y6 166
Y5 167
Y4 168
Y3 169
Y2 170
Y1 171
Y0 172
VDDA 173
VSS 174
UVG0 175
UVG1 176
UVG2 177
UVG3 178
UVG4 179
VDDC 180
VSS 181
UVG5 182
UVG6 183
UVG7 184
YG0 185
YG1 186
YG2 187
YG3 188
YG4 189
YG5 190
YG6 191
YG7 192
VDDA 193
VSS 194
CLK32O195
VSS 196
VDDC 197
VSS 198
RSTW_YUV199
WEYUV_F200
RSTRUV 201
REUV 202
RSTRY 203
REY 204
FALREF 205
REFIN 206
WEYUV_G 207
VDDA 208
PHILIPS EAGLE
104 TESTSEL2
103 TESTSEL1
102 TESTSEL0
101 CLK32I
100 VDDA
99
98
97 VSS
96 VSS
95 VDDC
94 VDDC
93
92
91
90 VDDC
89 VDDC
88 VSS
87 VSS
86
85
84 PDN
83 VDDC
82 VDDC
81 VSS
80 VSS
79
78 VDDBA
77 FSADJV
76 VBSV
75 VREFV
74 AOUTPV
73 AOUTNV
72 VSSA
71
70
69
68 VDDBA
67 FSADJU
66 VBSU
65 VREFU
64 AOUTPU
63 AOUTNU
62 VSSA
61 VSS
60 VDDB
59 VDDBA
58 FSADJY
57 VBSY
56 VREFY
55 AOUTPY
54 AOUTNY
53 VSSA
VDDC 1
VSS 2
VDDA 3
UVF0 4
UVF1 5
UVF2 6
UVF3 7
UVF4 8
UVF5 9
UVF6 10
UVF7 11
VSS 12
VDDC13
YF0 14
YF1 15
YF2 16
YF3 17
YF4 18
YF5 19
YF6 20
YF7 21
VSS 22
VDDC 23
VDDA 24
VSS 25
SNCK 26
SNRST 27
HD28
VD29
INTR1 30
VA 31
SNDA 32
HREF 33
TRST 34
TMS 35
VDDC 36
VDDC 37
VSS 38
VSS 39
VDDA 40
VSS 41
TDI 42
TDO 43
TCK 44
45
46
47
48
49
50
51
52

CL 16532149_110.eps
201201

Figure 9-31 Internal Block Diagram and Pinning T8F24EF (Eagle)

10. Spare Parts List

Large signal panel [A]

Various

	3122 785 90310	Mains supply repair kit
	3122 785 90460	Stanby supply repair kit
	3122 785 90330	Line deflection repair kit
0020	4822 492 70789	Fix transistor
0080	4822 492 70789	Fix transistor
0320	4822 255 41371	Line deflection spring
0341	4822 492 63524	Fix transistor
0342	4822 492 63524	Fix transistor
0395	4822 492 70789	Fix transistor
0396	4822 492 70789	Fix transistor
0505	3122 121 24785	Spring for bracket
1146	4822 267 10734	5p
1200	3139 147 17311	Tuner UV1316/A I U-3
1205	2422 025 17242	Simm connector 80p
1417	4822 265 20723	2p
1424	2422 025 11244	7p male
1491	4822 267 10973	1p
1492	4822 267 10735	3p
1495	4822 265 30734	4p
1498	2422 025 04849	2p
1499	2422 025 04849	2p
1501	4822 070 35002	Fuse 5A
1502	4822 267 10774	2p male (red)
1503	4822 070 12502	Fuse 2.5A
1505	2422 025 16374	2p male
1511	4822 265 11253	Fuse holder
1512	4822 265 11253	Fuse holder
1520	4822 492 63524	Fix transistor
1550	2422 132 07411	Relay G5PA-1
1590	4822 252 60151	Spark gap
1601	2422 086 10919	Fuse 125mA 65V
1620	4822 267 10735	3p
1625	2422 025 16382	3p male
1693	4822 267 10676	1p
1735	4822 267 10565	4p
1737	2422 025 16382	3p male
1738	2422 025 16383	3p
1901	4822 267 10771	42p female
1902	4822 267 10982	2p
1936	2422 025 12485	11p male
1937	4822 267 10557	10p
1940	2422 025 12485	11p male
1943	4822 267 10748	3p
1945	4822 267 10735	3p
1946	4822 265 41391	9p
1955	4822 267 10735	3p
8000	3104 311 03721	EHT cable
8193	4822 320 20216	Focus cable
8194	4822 320 20189	Focus cable
8400	2422 025 16691	3p
8417	3104 311 04561	2p 400mm
8424	3104 311 02991	7p 560mm
8492	3104 311 01731	3p 400mm
8495	3104 311 03041	4p 480mm
8498	3104 311 04531	2p 400mm
8625	3104 311 03101	3p 560mm
8625	3104 311 04741	3p 180mm
8737	3104 311 04682	2p 680mm
8937	3104 301 09841	10p 340mm
8940	3104 311 04651	11p 140mm
8955	3104 311 01211	3p 140mm

⊣⊢

2100	4822 126 13841	1nF 20% 250V
2101	5322 122 32818	2.2nF 10% 100V
2102	4822 124 40248	10µF% 63V
2103	2020 552 94427	100pF 5% 50V
2104	4822 123 14025	2200µF 20% 16V
2105	2020 552 94427	100pF 5% 50V
2106	4822 126 14472	1µF 10% 10V
2107	4822 121 43855	3.3nF 5% 400V
2108	4822 121 70162	10nF 5% 400V
2109	4822 126 14472	1µF 10% 10V
2110	4822 126 14472	1µF 10% 10V
2111	4822 121 43526	47nF 5% 250V
2112	5322 126 11583	10nF 10% 50V
2114	4822 121 10711	100nF 20% 275V
2115	4822 124 40764	22µF 100 V
2116	4822 126 13682	100pF 5% 1kV
2118	4822 124 80061	1000µF 20% 25V
2119	4822 123 14025	2200µF 20% 16V
2120	4822 126 11524	1.5nF 10% 1kV
2126	4822 123 14025	2200µF 20% 16V
2130	5322 126 11583	10nF 10% 50V
2131	5322 126 11578	1nF 10% 50V
2140	4822 124 40248	10µF 20% 63V
2141	4822 124 40248	10µF 20% 63V
2144	4822 126 14472	1µF 10% 10V
2145	4822 126 13881	470pF 5% 50V
2147	3198 017 31530	15nF 50V
2148	4822 126 10206	2.2nF 10% 500V
2149	4822 126 14472	1µF 10% 10V
2150	5322 126 11583	10nF 10% 50V
2152	4822 121 70162	10nF 5% 400V
2154	4822 126 14549	33nF 16V
2200	4822 124 40248	10µF 20% 63V
2201	4822 126 13879	220nF 20% 16V
2202	4822 126 13473	220nF 20-80% 50V
2203	4822 124 80195	470µF 20% 10V
2400	4822 124 11575	47µF 20% 160V
2401	4822 121 42077	6.8nF 10% 400V
2402	2020 012 93596	22µF 20%250V
2403	4822 126 14494	22nF 10% 25V
2404	4822 126 14494	22nF 10% 25V
2412	3198 024 44730	47nF 50V
2413	4822 124 12255	10µF 20% 50V
2414	3198 024 44730	47nF 50V
2415	4822 126 13883	220pF 5% 50V
2417	4822 126 14076	220nF 25V
2419	4822 126 14237	470pF 10% 2kV
2420	4822 121 70581	1.5nF 5% 2kV
2420	4822 121 70594	1nF 5% 2kV
2421	2038 301 00312	1.2µF 5% 250V
2425	4822 121 10526	9N1 5% 2kV
2425	4822 121 70435	10nF 5% 2kV
2426	4822 121 10551	27nF 5% 1600V
2426	4822 121 10653	22nF 5% 630V
2430	4822 126 10206	2.2nF 10% 500V
2431	4822 126 10206	2.2nF 10% 500V
2433	2022 333 00163	360nF 5% 250V
2433	2222 479 90022	0.43µF 250V
2433	4822 121 10518	390nF 5% 50V
2440	2020 552 96448	1µF 10% 16V
2441	5322 122 32654	22nF 10% 63V
2442	5322 122 31866	6.8nF 10% 63V
2443	5322 122 34099	470pF 10% 63V
2445	5322 122 32654	22nF 10% 63V
2448	5322 122 32268	470pF 5% 63V
2450	5322 121 42578	100nF 5% 250V
2451	2020 012 93757	1000µF 20% 10V
2454	3198 017 31530	15nF 50V
2455	5322 126 11578	1nF 10% 50V
2457	8204 000 75481	15nF 5% 25V
2458	4822 126 14241	330pF 50V
2460	4822 124 81144	1000µF 16V
2461	4822 122 31169	1.5nF 10% 500V
2462	4822 124 80061	1000µF 20% 25V
2463	4822 122 31177	470pF 10% 500V
2464	4822 124 80061	1000µF 20% 25V
2465	4822 122 31177	470pF 10% 500V
2466	2238 586 59812	100nF 50V
2468	4822 122 31177	470pF 10% 500V
2480	5322 126 11582	6.8nF 10% 63V
2482	3198 017 34730	47nF 16V
2490	4822 124 23432	100µF 20% 10V
2491	4822 124 81151	22µF 50V
2492	4822 124 23432	100µF 20% 10V
2493	4822 122 33891	3.3nF 10% 63V
2494	2238 780 15654	220nF 10% 16V
2495	2238 780 15654	220nF 10% 16V
2497	4822 126 12105	33nF 5% 50V
2498	2020 552 96448	1µF 10% 16V
2499	5322 126 11579	3.3nF 10% 63V
2501	4822 126 14053	1nF 10% 2kV
2503	5322 121 42489	33nF 5% 250V
2504	4822 126 14494	22nF 10% 25V
2505	2020 554 90173	2.2nF 250V
2506	5322 121 42386	100nF 5% 63V
2507	4822 126 13589	470nF 275V
2508	4822 124 11913	22nF 20% 275V
2509	4822 124 11913	22nF 20% 275V
2510	4822 126 14053	1nF 10% 2kV
2511	4822 124 12417	2200µF 20% 25V
2512	4822 124 12417	2200µF 20% 25V
2513	4822 126 13881	470pF 5% 50V
2514	4822 126 14238	2.2nF 50V
2515	4822 124 80096	47µF 200V
2516	4822 124 12415	220µF 20% 400V
2517	4822 121 70162	10nF 5% 400V
2518	4822 122 31211	100pF 10% 500V
2519	4822 126 10206	2.2nF 10% 500V
2520	4822 121 10711	100nF 20% 275V
2522	4822 126 10206	2.2nF 10% 500V
2525	4822 126 14247	1.5nF 50V
2528	4822 126 14472	1µF 10% 10V
2530	4822 126 14472	1µF 10% 10V
2531	4822 122 31177	470pF 10% 500V
2535	4822 126 13193	4.7nF 10% 63V
2537	4822 124 11913	22nF 20% 275V
2538	4822 122 33177	10nF 20% 50V
2540	4822 124 40248	10µF 20% 63V
2541	4822 122 31211	100pF 10% 500V
2542	4822 124 80061	1000µF 20% 25V
2543	4822 124 80061	1000µF 20% 25V
2544	4822 126 14238	2.2nF 50V
2601	2238 586 59812	100nF 50V
2603	4822 126 13883	220pF 5% 50V
2604	4822 126 13473	220nF 20-80% 50V
2605	4822 126 13883	220pF 5% 50V
2620	4822 126 13473	220nF 20-80% 50V
2621	2238 586 59812	100nF 50V
2622	4822 124 40255	100µF 20% 63V
2623	4822 126 14238	2.2nF 50V
2624	4822 121 51252	470nF 5% 63V
2625	4822 121 51252	470nF 5% 63V
2627	5322 124 40641	10µF 20% 100V
2628	4822 124 40255	100µF 20% 63V
2630	5322 126 14103	2.2µF 20% 10V
2631	5322 126 14103	2.2µF 20% 10V
2633	5322 126 11579	3.3nF 10% 63V
2635	2238 586 59812	100nF 50V
2642	4822 124 40255	100µF 20% 63V
2653	5322 126 11579	3.3nF 10% 63V
2656	4822 126 14494	22nF 10% 25V
2657	4822 126 14494	22nF 10% 25V
2659	4822 126 14494	22nF 10% 25V
2660	5322 126 11578	1nF 10% 50V
2702	3198 016 31020	1nF 25V
2704	3198 016 31020	1nF 25V
2705	4822 126 13482	470nF 20-80% 16V
2706	4822 126 14585	100nF 10% 50V
2707	4822 126 13879	220nF 20% 16V
2708	4822 126 14076	220nF 25V
2709	4822 126 13881	470pF 5% 50V
2710	4822 126 13881	470pF 5% 50V
2711	3198 016 31020	1nF 25V
2712	2020 552 96683	220nF 10% 50V
2713	4822 126 14076	220nF 25V
2714	4822 126 14549	33nF 16V
2715	3198 016 31020	1nF 25V
2716	4822 126 14241	330pF 50V
2717	5322 121 42498	680nF 5% 63V
2718	2238 861 18339	33pF 1% 50V
2719	3198 016 31020	1nF 25V
2720	4822 126 14076	220nF 25V
2721	4822 126 13881	470pF 5% 50V
2722	4822 126 13881	470pF 5% 50V
2723	3198 016 31020	1nF 25V
2724	2020 552 96683	220nF 10% 50V
2725	3198 016 31020	1nF 25V
2726	4822 126 14549	33nF 16V
2727	3198 016 31020	1nF 25V
2728	4822 126 14241	330pF 50V
2729	5322 121 42498	680nF 5% 63V
2740	4822 121 51252	470nF 5% 63V
2741	2238 861 18339	33pF 1% 50V
2742	4822 126 14241	330pF 50V
2743	4822 126 12105	33nF 5% 50V
2744	4822 126 12105	33nF 5% 50V
2745	4822 126 14241	330pF 50V
2746	3198 016 31020	1nF 25V
2747	4822 126 13881	470pF 5% 50V
2748	2020 552 96683	220nF 10% 50V
2749	5322 126 14103	2.2µF 20% 10V
2750	2238 586 59812	100nF 50V
2751	4822 126 14585	100nF 10% 50V
2753	4822 126 14076	220nF 25V
2754	5322 126 14103	2.2µF 20% 10V
2755	3198 016 31020	1nF 25V
2756	4822 126 13881	470pF 5% 50V
2757	2020 552 96683	220nF 10% 50V
2758	5322 121 42498	680nF 5% 63V
2759	5322 126 10511	1nF 5% 50V
2760	5322 122 32268	470pF 5% 63V
2761	4822 126 13881	470pF 5% 50V
2762	4822 126 14076	220nF 25V
2763	4822 126 13879	220nF 20% 16V
2777	2020 552 96684	470nF 10% 25V
2778	4822 124 41751	47µF 20% 50V
2779	2020 552 96684	470nF 10% 25V
2780	2020 552 96684	470nF 10% 25V

2781	2020 552 96684	470nF 10% 25V
2782	2020 552 96684	470nF 10% 25V
2783	2020 552 96684	470nF 10% 25V
2784	2020 552 96684	470nF 10% 25V
2785	2020 552 96684	470nF 10% 25V
2786	4822 126 14494	22nF 10% 25V
2787	4822 126 14494	22nF 10% 25V
2788	2020 552 94427	100pF 5% 50V
2789	2020 552 94427	100pF 5% 50V
2790	2020 552 94427	100pF 5% 50V
2794	2020 552 94427	100pF 5% 50V
2795	2020 552 94427	100pF 5% 50V
2796	2020 552 94427	100pF 5% 50V
2797	2020 552 94427	100pF 5% 50V
2798	2020 552 94427	100pF 5% 50V
2914	4822 124 40248	10µF 20% 63V
2915	4822 124 40248	10µF 20% 63V
2929	4822 126 13879	220nF 20% 16V
2940	4822 124 23432	100µF 20% 10V
2941	4822 126 14585	100nF 10% 50V
2942	4822 126 14585	100nF 10% 50V
2943	4822 126 14585	100nF 10% 50V
2945	5322 126 14103	2.2µF 20% 10V
2946	5322 126 14103	2.2µF 20% 10V
2947	2020 021 90141	4.7µF 20% 50V
2948	4822 124 23432	100µF 20% 10V
2949	4822 124 23432	100µF 20% 10V
2950	5322 126 11583	10nF 10% 50V
2951	5322 126 11583	10nF 10% 50V
2985	4822 126 14315	390pF 5% 50V
2987	5322 122 31863	330pF 5% 63V
2989	5322 122 31863	330pF 5% 63V
2990	5322 122 31863	330pF 5% 63V
2991	5322 122 32531	100pF 5% 50V
2992	5322 122 31863	330pF 5% 63V
2993	5322 122 32531	100pF 5% 50V
2994	5322 122 31863	330pF 5% 63V
2995	5322 122 31863	330pF 5% 63V
2996	5322 122 31863	330pF 5% 63V
2997	5322 122 31863	330pF 5% 63V
2998	5322 122 32531	100pF 5% 50V
2999	5322 122 32531	100pF 5% 50V

-▭-

3101	4822 053 20106	10MΩ 5% 0.25W
3102	4822 050 21002	1k 1% 0.6W
3103	4822 050 21002	1k 1% 0.6W
3104	4822 116 52195	47Ω 5% 0.5W
3105	4822 050 11002	1k 1% 0.4W
3106	4822 116 52256	2k2 5% 0.5W
3107	4822 116 52256	2k2 5% 0.5W
3108	4822 116 80676	1Ω5 5% 0.5W
3111	4822 053 10152	1k5 5% 1W
3113	4822 116 52186	22Ω 5% 0.5W
3114	4822 116 83872	220Ω 5% 0.5W
3115	4822 116 52257	22k 5% 0.5W
3116	4822 116 52257	22k 5% 0.5W
3117	4822 116 52195	47Ω 5% 0.5W
3118	4822 116 80676	1Ω5 5% 0.5W
3120	4822 051 20109	10Ω 5% 0.1W
3123	4822 051 30109	10Ω 5% 62mW
3124	4822 116 52199	68Ω 5% 0.5W
3125	4822 116 52182	15Ω 5% 0.5W
3126	4822 050 21003	10k 1% 0.6W
3127	4822 116 52289	5k6 5% 0.5W
3130	4822 051 30479	47Ω 5% 62mW
3131	4822 051 30471	470Ω 5% 62mW
3132	4822 051 20479	47Ω 5% 0.1W
3133	4822 117 10834	47k 1% 0.1W
3134	4822 051 30102	1k 5% 62mW
3135	4822 051 30101	100Ω 5% 62mW
3136	4822 051 30109	10Ω 5% 62mW
3137	4822 050 24702	4k7 1% 0.6W
3140	4822 117 10837	100k 1% 0.1W
3141	4822 116 52263	2k7 5% 0.5W
3142	4822 051 30332	3k3 5% 62mW
3143	4822 051 30101	100Ω 5% 62mW
3144	4822 116 83883	470Ω 5% 0.5W
3150	4822 117 11373	100Ω 1%
3151	4822 051 30101	100Ω 5% 62mW
3152	4822 051 30102	1k 5% 62mW
3153	4822 051 20472	4k7 5% 0.1W
3155	4822 051 30101	100Ω 5% 62mW
3156	5322 117 13017	100Ω 1% 63mW
3157	4822 051 30103	10k 5% 62mW
3158	5322 117 13021	47Ω 1% 63mW
3159	4822 051 30103	10k 5% 62mW
3160	4822 051 30102	1k 5% 62mW
3161	4822 052 10221	220Ω 5% 0.33W
3162	4822 116 83883	470Ω 5% 0.5W
3164	4822 117 13632	100k 1% 620mW
3165	4822 051 30331	330Ω 5% 62mW
3168	4822 051 20472	4k7 5% 0.1W
3170	4822 116 52291	56k 5% 0.5W
3171	4822 116 52244	15k 5% 0.5W
3200	4822 117 11373	100Ω 1%
3201	4822 117 11373	100Ω 1%
3250	4822 051 20223	22k 5% 0.1W
3261	4822 117 11373	100Ω 1%
3262	4822 117 11373	100Ω 1%
3400	4822 052 11108	1Ω 5% 0.5W
3401	2120 105 93473	27Ω 5% 3W
3402	4822 053 10121	120Ω 5% 1W
3403	4822 116 52175	100Ω 5% 0.5W
3404	4822 051 30471	470Ω 5% 62mW
3406	4822 117 11373	100Ω 1%
3407	4822 051 30103	10k 5% 62mW
3409	4822 050 11002	1k 1% 0.4W
3410	4822 051 20479	47Ω 5% 0.1W
3411	4822 116 52193	39Ω 5% 0.5W
3412	4822 117 11817	1k2 1% 62mW
3414	4822 051 30331	330Ω 5% 62mW
3415	3198 012 31590	15Ω 3W
3417	4822 116 52176	10Ω 5% 0.5W
3418	4822 050 25603	56k 1% 0.6W
3419	4822 051 30474	470k 5% 62mW
3420	4822 051 30332	3k3 5% 62mW
3421	4822 051 30474	470k 5% 62mW
3422	4822 051 30332	3k3 5% 62mW
3423	4822 053 10688	6Ω8 5% 1W
3425	4822 116 52176	10Ω 5% 0.5W
3426	4822 116 52176	10Ω 5% 0.5W
3431	2306 207 03151	150Ω 5%
3440	4822 051 30102	1k 5% 62mW
3441	4822 051 30223	22k 5% 62mW
3442	4822 051 30474	470k 5% 62mW
3443	4822 051 30684	680k 5% 62mW
3444	4822 051 20108	1Ω 5% 0.1W
3447	4822 117 11373	100Ω 1%
3449	4822 052 10101	100Ω 5% 0.33W
3450	4822 050 21003	10k 1% 0.6W
3451	4822 050 21003	10k 1% 0.6W
3454	4822 051 20108	1Ω 5% 0.1W
3455	4822 117 12902	8k2 1% 63mW
3456	4822 117 12903	1k8 1% 63mW
3457	4822 051 30152	1k5 5% 62mW
3458	4822 051 30471	470Ω 5% 62mW
3459	4822 051 30272	2k7 5% 62mW
3460	4822 052 10108	1Ω 5% 0.33W
3461	4822 052 10108	1Ω 5% 0.33W
3462	4822 052 11108	1Ω 5% 0.5W
3463	4822 052 11108	1Ω 5% 0.5W
3464	4822 052 11108	1Ω 5% 0.5W
3465	4822 052 11108	1Ω 5% 0.5W
3466	4822 051 30472	4k7 5% 62mW
3467	4822 117 13632	100k 1% 620mW
3472	4822 051 30393	39k 5% 62mW
3474	4822 051 30563	56k 5% 62mW
3475	4822 051 30472	4k7 5% 62mW
3476	4822 116 83874	220k 5% 0.5W
3478	4822 116 52175	100Ω 5% 0.5W
3479	4822 052 10478	4Ω7 5% 0.33W
3480	4822 052 10478	4Ω7 5% 0.33W
3480	4822 052 10688	6Ω8 5% 0.33W
3481	2322 750 61001	100Ω 5%
3482	4822 051 30221	220Ω 5% 62mW
3483	4822 117 12903	1k8 1% 63mW
3485	4822 051 30471	470Ω 5% 62mW
3486	2120 108 94004	7k5 1% 3W
3487	4822 117 12902	8k2 1% 63mW
3488	4822 050 21005	1M 1% 0.6W
3488	4822 050 26804	680k 1% 0.6W
3489	4822 051 30103	10k 5% 62mW
3490	4822 051 30332	3k3 5% 62mW
3491	4822 117 12925	47k 1% 63mW
3492	4822 116 52175	100Ω 5% 0.5W
3493	4822 050 21504	150k 1% 0.6W
3495	4822 050 21503	15k 1% 0.6W
3496	4822 051 30272	2k7 5% 62mW
3497	4822 051 30333	33k 5% 62mW
3498	4822 052 11568	5Ω6 5% 0.5W
3499	4822 052 11568	5Ω6 5% 0.5W
3501	4822 116 83872	220Ω 5% 0.5W
3504	4822 051 30222	2k2 5% 62mW
3505	4822 116 52257	22k 5% 0.5W
3506	4822 051 30562	5k6 5% 63mW
3507	4822 050 21604	160k 1% 0.6W
3508	4822 116 52182	15Ω 5% 0.5W
3509	2322 595 90022	VDR 1mA/612V
3510	4822 117 11454	820Ω 1% 0.1W
3511	4822 053 11222	2k2 5% 2W
3512	4822 117 12891	220k 1% 3W
3513	4822 116 52272	330k 5% 0.5W
3514	2322 193 53397	0Ω39 5%
3515	2322 193 53397	0Ω39 5%
3517	4822 117 10834	47k 1% 0.1W
3518	4822 116 52245	150k 5% 0.5W
3519	4822 051 30102	1k 5% 62mW
3520	4822 053 11333	33k 5% 2W
3521	4822 053 21475	4M7 5% 0.5W
3522	4822 117 11507	6k8 1% 0.1W
3523	4822 051 20105	1M 5% 0.1W
3524	4822 051 30333	33k 5% 62mW
3525	4822 051 30479	47Ω 5% 62mW
3526	4822 116 83303	0.1Ω 2W
3527	4822 117 11951	2k 1% 0.1W
3528	4822 051 30103	10k 5% 62mW
3529	4822 051 30472	4k7 5% 62mW
3530	4822 051 30102	1k 5% 62mW
3531	4822 117 11507	6k8 1% 0.1W
3532	4822 117 12925	47k 1% 63mW
3533	4822 116 52182	15Ω 5% 0.5W
3534	4822 117 12925	47k 1% 63mW
3535	4822 051 30479	47Ω 5% 62mW
3536	4822 052 10102	1k 5% 0.33W
3537	4822 116 52182	15Ω 5% 0.5W
3540	4822 050 23303	33k 1% 0.6W
3543	4822 050 24708	4Ω7 1% 0.6W
3547	4822 051 30008	ϑumper
3549	5322 117 13039	220k 1% 63mW
3550	2322 662 96858	4Ω5 2% 276V
3551	4822 116 83872	220Ω 5% 0.5W
3552	4822 051 30222	2k2 5% 62mW
3553	4822 051 30103	10k 5% 62mW
3610	4822 051 30223	22k 5% 62mW
3611	4822 051 30222	2k2 5% 62mW
3620	4822 116 80176	1Ω 5% 0.5W
3621	4822 116 80176	1Ω 5% 0.5W
3621	4822 116 80676	1Ω5 5% 0.5W
3622	4822 116 80176	1Ω 5% 0.5W
3622	4822 116 80676	1Ω5 5% 0.5W
3622	4822 116 81039	1Ω8 5% 0.5W
3623	4822 116 52251	18k 5% 0.5W
3624	4822 052 10158	1Ω5 5% 0.33W
3625	4822 050 15609	56Ω 1% 0.4W
3625	4822 116 52206	120Ω 5% 0.5W
3625	4822 116 83872	220Ω 5% 0.5W
3626	4822 050 15609	56Ω 1% 0.4W
3626	4822 116 52175	100Ω 5% 0.5W
3626	4822 116 83872	220Ω 5% 0.5W
3627	4822 051 20223	22k 5% 0.1W
3630	4822 051 30333	33k 5% 62mW
3631	4822 051 30222	2k2 5% 62mW
3632	4822 051 30393	39k 5% 62mW
3633	4822 051 30563	56k 5% 62mW
3634	4822 116 83882	39k 5% 0.5W
3635	4822 116 52219	330Ω 5% 0.5W
3636	4822 051 30223	22k 5% 62mW
3637	4822 051 30103	10k 5% 62mW
3638	4822 051 30474	470k 5% 62mW
3639	4822 051 30563	56k 5% 62mW
3640	4822 051 30222	2k2 5% 62mW
3641	4822 116 83883	470Ω 5% 0.5W
3642	4822 101 11193	47k 30%0.1W
3643	4822 051 30334	330k 5% 62mW
3644	4822 051 30221	220Ω 5% 62mW
3645	4822 116 52245	150k 5% 0.5W
3646	4822 117 12925	47k 1% 63mW
3647	4822 051 20228	2Ω2 5% 0.1W
3652	4822 051 20479	47Ω 5% 0.1W
3653	4822 051 20223	22k 5% 0.1W
3654	4822 051 20472	4k7 5% 0.1W
3655	4822 051 30123	12k 5% 62mW
3656	4822 117 11817	1k2 1% 62mW
3657	4822 051 30223	22k 5% 62mW
3658	4822 051 30223	22k 5% 62mW
3659	4822 051 30222	2k2 5% 62mW
3660	4822 051 30562	5k6 5% 63mW
3661	4822 116 52206	120Ω 5% 0.5W
3661	4822 116 83872	220Ω 5% 0.5W
3661	4822 116 83883	470Ω 5% 0.5W
3662	4822 051 30152	1k5 5% 62mW
3663	4822 116 52213	180Ω 5% 0.5W
3663	4822 116 52226	560Ω 5% 0.5W
3681	4822 116 52207	1k2 5% 0.5W
3682	4822 117 13632	100k 1% 620mW
3683	4822 051 30103	10k 5% 62mW
3684	4822 051 30682	6k8 5% 62mW
3685	4822 051 30273	27k 5% 62mW
3686	4822 051 30563	56k 5% 62mW
3687	4822 116 52207	1k2 5% 0.5W
3688	4822 051 20684	680k 5% 0.1W
3701	4822 051 30103	10k 5% 62mW
3702	4822 051 30103	10k 5% 62mW
3703	4822 051 30333	33k 5% 62mW
3704	4822 117 10833	10k 1% 0.1W
3705	4822 051 20828	8Ω2 5% 0.1W
3706	4822 051 30472	4k7 5% 62mW
3707	4822 051 30683	68k 5% 62mW
3708	4822 051 30563	56k 5% 62mW

3709	4822 117 11503	220Ω 1% 0.1W
3710	4822 051 30223	22k 5% 62mW
3711	4822 050 11204	120k 1% 0.4W
3712	4822 117 12706	10k 1% 63mW
3713	4822 116 83884	47k 5% 0.5W
3714	4822 117 12925	47k 1% 63mW
3715	4822 117 12925	47k 1% 63mW
3716	4822 117 12925	47k 1% 63mW
3717	4822 117 13632	100k 1% 620mW
3718	4822 117 13632	100k 1% 620mW
3719	4822 117 11503	220Ω 1% 0.1W
3720	4822 117 11503	220Ω 1% 0.1W
3721	4822 051 30472	4k7 5% 62mW
3722	4822 051 30683	68k 5% 62mW
3723	4822 051 30563	56k 5% 62mW
3724	4822 117 11503	220Ω 1% 0.1W
3725	4822 051 30223	22k 5% 62mW
3726	4822 117 11503	220Ω 1% 0.1W
3727	4822 117 11503	220Ω 1% 0.1W
3728	4822 116 52234	100k 5% 0.5W
3729	4822 117 10837	100k 1% 0.1W
3730	4822 117 11503	220Ω 1% 0.1W
3731	4822 117 11503	220Ω 1% 0.1W
3732	4822 051 30223	22k 5% 62mW
3733	4822 051 30223	22k 5% 62mW
3734	4822 051 20124	120k 5% 0.1W
3735	4822 051 30683	68k 5% 62mW
3736	4822 051 30563	56k 5% 62mW
3737	4822 051 30472	4k7 5% 62mW
3738	4822 051 20828	8Ω2 5% 0.1W
3739	4822 051 30683	68k 5% 62mW
3740	4822 051 30472	4k7 5% 62mW
3741	2322 704 61243	12k4 1%
3742	4822 051 30563	56k 5% 62mW
3743	4822 117 11449	2k2 5% 0.1W
3745	4822 051 30102	1k 5% 62mW
3746	4822 051 30223	22k 5% 62mW
3748	4822 051 30008	Jumper
3749	4822 050 11002	1k 1% 0.4W
3750	4822 117 11449	2k2 5% 0.1W
3751	4822 117 11449	2k2 5% 0.1W
3752	4822 117 11449	2k2 5% 0.1W
3790	4822 051 30272	2k7 5% 62mW
3791	4822 051 30272	2k7 5% 62mW
3792	4822 051 30103	10k 5% 62mW
3793	4822 051 30103	10k 5% 62mW
3794	4822 051 30103	10k 5% 62mW
3795	4822 051 30103	10k 5% 62mW
3796	4822 051 30272	2k7 5% 62mW
3797	4822 051 30272	2k7 5% 62mW
3798	4822 051 30153	15k 5% 62mW
3903	4822 051 20561	560Ω 5% 0.1W
3904	4822 052 10688	6Ω8 5% 0.33W
3907	4822 051 20479	47Ω 5% 0.1W
3910	4822 117 12521	68Ω 1% 0.1W
3928	4822 051 30008	Jumper
3938	4822 117 11373	100Ω 1%
3939	4822 051 30103	10k 5% 62mW
3940	4822 051 20561	560Ω 5% 0.1W
3941	4822 052 10688	6Ω8 5% 0.33W
3942	4822 117 11373	100Ω 1%
3943	4822 051 30103	10k 5% 62mW
3945	4822 117 12955	2k7 1% 0.1W
3959	4822 117 10353	150Ω 1% 0.1W
3960	4822 117 10353	150Ω 1% 0.1W
3961	4822 117 10353	150Ω 1% 0.1W
3962	4822 117 10353	150Ω 1% 0.1W
3965	4822 117 10353	150Ω 1% 0.1W
3966	4822 117 10353	150Ω 1% 0.1W
3967	4822 116 52201	75Ω 5% 0.5W
3968	4822 116 52201	75Ω 5% 0.5W
3969	4822 051 20008	Jumper
3970	4822 051 20008	Jumper
3971	4822 116 52201	75Ω 5% 0.5W
3972	4822 116 52202	82Ω 5% 0.5W
3973	4822 116 52201	75Ω 5% 0.5W
3974	4822 116 52201	75Ω 5% 0.5W
3975	4822 116 52201	75Ω 5% 0.5W
3976	4822 117 11373	100Ω 1%
3977	4822 117 11373	100Ω 1%
3978	4822 117 11373	100Ω 1%
3979	4822 116 52201	75Ω 5% 0.5W
3980	4822 117 11373	100Ω 1%
3981	4822 051 20822	8k2 5% 0.1W
3982	4822 051 20392	3k9 5% 0.1W
3983	4822 116 52175	100Ω 5% 0.5W
3984	4822 051 20822	8k2 5% 0.1W
3985	4822 116 52201	75Ω 5% 0.5W
3986	4822 116 52276	3k9 5% 0.5W
3987	4822 116 52175	100Ω 5% 0.5W
3988	4822 051 10102	1k 2% 0.25W
3989	4822 050 11002	1k 1% 0.4W
3990	4822 117 10353	150Ω 1% 0.1W
3991	4822 117 10353	150Ω 1% 0.1W

3992	4822 117 10353	150Ω 1% 0.1W
3993	4822 116 83868	150Ω 5% 0.5W
3994	4822 051 10102	1k 2% 0.25W
3995	4822 051 10102	1k 2% 0.25W
3996	4822 117 10353	150Ω 1% 0.1W
3997	4822 117 10353	150Ω 1% 0.1W
9103	4822 051 20008	Jumper
9105	4822 051 20008	Jumper
9200	4822 051 20008	Jumper
9203	4822 051 30008	Jumper
9204	4822 051 20008	Jumper
9207	4822 051 30008	Jumper
9208	4822 051 20008	Jumper
9209	4822 051 20008	Jumper
9210	4822 051 30008	Jumper
9211	4822 051 30008	Jumper
9212	4822 051 20008	Jumper
9214	4822 051 20008	Jumper
9215	4822 051 20008	Jumper
9216	4822 051 20008	Jumper
9217	4822 051 20008	Jumper
9218	4822 051 20008	Jumper
9219	4822 051 20008	Jumper
9221	4822 051 20008	Jumper
9222	4822 051 20008	Jumper
9251	4822 051 30008	Jumper
9261	4822 051 20008	Jumper
9262	4822 051 20008	Jumper
9263	4822 051 20008	Jumper
9264	4822 051 20008	Jumper
9418	4822 051 20008	Jumper
9421	4822 051 20008	Jumper
9422	4822 051 30008	Jumper
9424	4822 051 30008	Jumper
9427	4822 051 30008	Jumper
9428	4822 051 30008	Jumper
9429	4822 051 30008	Jumper
9430	4822 051 30008	Jumper
9431	4822 051 30008	Jumper
9432	4822 051 30008	Jumper
9433	4822 051 30008	Jumper
9434	4822 051 30008	Jumper
9435	4822 051 30008	Jumper
9436	4822 051 30008	Jumper
9437	4822 051 30008	Jumper
9438	4822 051 30008	Jumper
9440	4822 051 30008	Jumper
9441	4822 051 30008	Jumper
9443	4822 051 30008	Jumper
9481	4822 051 30008	Jumper
9483	4822 051 30008	Jumper
9499	4822 051 30008	Jumper
9505	4822 051 20008	Jumper
9560	4822 051 30008	Jumper
9561	4822 051 20008	Jumper
9621	4822 051 30008	Jumper
9624	4822 051 30008	Jumper
9676	4822 051 30008	Jumper
9677	4822 051 20008	Jumper
9702	4822 051 30008	Jumper
9705	4822 051 20008	Jumper
9706	4822 050 11002	1k 1% 0,4W
9707	4822 051 30008	Jumper
9709	4822 051 20008	Jumper
9711	4822 051 30008	Jumper
9713	4822 051 30008	Jumper
9714	4822 051 20008	Jumper
9716	4822 051 20008	Jumper
9717	4822 051 30008	Jumper
9908	4822 051 30008	Jumper
9927	4822 051 20008	Jumper
9928	4822 051 20008	Jumper
9960	4822 051 30008	Jumper
9962	4822 051 30008	Jumper
9966	4822 051 30008	Jumper
9979	4822 051 20008	Jumper
9981	4822 051 20008	Jumper
9984	4822 126 13879	220nF 20-80% 16V
9985	4822 051 30008	Jumper
9986	4822 051 20008	Jumper
9987	4822 051 20008	Jumper
9988	4822 051 20008	Jumper
9989	4822 051 20008	Jumper
9990	4822 051 20008	Jumper
9991	4822 051 20008	Jumper
9992	4822 051 20008	Jumper
9993	4822 051 20008	Jumper
9994	4822 051 20008	Jumper
9995	4822 051 20008	Jumper
9997	4822 051 20008	Jumper

5100	3104 308 20431	Transformer BS25126-03
5102	2422 535 94639	10µH 20%
5103	4822 526 10704	Bead 100MHz
5104	4822 157 11411	Bead 100MHz
5105	2422 535 94632	1µH 30%
5106	4822 526 10704	Bead 100MHz
5111	4822 157 11411	Bead 100MHz
5113	4822 157 11411	Bead 100MHz
5130	4822 157 11411	Bead 100MHz
5400	4822 157 11869	33µH 10%
5401	2422 536 00059	12µH 10%
5402	3198 018 21510	150µH 10%
5410	3128 138 39091	Transformer CE165T
5411	4822 157 71097	0.56µH
5421	3128 138 56152	Lin. cor. coil 28”
5421	3128 138 57871	Lin. cor. coil 32”
5421	4822 157 11839	Lin. cor. coil 36”
5422	3128 138 39981	Bridge coil 28”
5422	4822 146 11137	Bridge coil 32”/36”
5423	4822 157 71097	0.56µH
5425	4822 157 11411	Bead 100MHz
5426	4822 157 70826	2.4µH
5430	2422 531 02532	LOT 32”
5430	8204 000 75231	LOT 32”
5430	8204 000 75241	LOT 28”
5461	4822 157 11411	Bead 100MHz
5463	4822 157 11411	Bead 100MHz
5465	4822 157 11411	Bead 100MHz
5467	4822 157 11411	Bead 100MHz
5469	4822 157 11411	Bead 100MHz
5503	2422 549 44877	Mainsfilter 45mH 1.5A DMF2845H
5505	4822 157 11411	Bead 100MHz
5507	4822 157 11411	Bead 100MHz
5509	4822 157 11411	Bead 100MHz
5511	2422 549 44873	Mains harmonic filter 56mH
5512	2422 531 02501	Transformer S30940-04
5513	4822 157 11869	33µH 10%
5514	4822 157 11869	33µH 10%
5515	4822 157 11869	33µH 10%
5620	4822 157 11771	0.09µH 10% 3.5X11
5621	2422 531 02528	Transformer S13974-02 Y
5701	2422 536 00385	68µH 10%
5702	2422 536 00385	68µH 10%
5703	4822 157 11716	BLM21P300SPT
5707	4822 157 11411	Bead 100MHz
5708	4822 157 11411	Bead 100MHz
5711	4822 157 11411	Bead 100MHz
5712	4822 157 11411	Bead 100MHz
5715	4822 157 11411	Bead 100MHz
5716	4822 157 11411	Bead 100MHz
5720	2422 536 00385	68µH 10%
5721	2422 536 00385	68µH 10%
5722	4822 157 11411	Bead 100MHz
5723	4822 157 11411	Bead 100MHz
5725	4822 157 11411	Bead 100MHz
5901	4822 157 11299	EL0305RA-100J
5902	4822 157 11869	33µH 10%
5903	4822 157 10359	33µH

6080	4822 130 11397	BAS316
6082	4822 130 11528	1PS76SB10
6103	4822 130 42488	BYD33D
6105	4822 130 34281	BZX79-B15
6106	3198 010 52290	BZX79-B22
6108	4822 130 11528	1PS76SB10
6109	4822 130 31083	BYW55
6110	9340 418 70133	BYV27-600 A
6111	9322 161 78682	SB360L-7024
6112	4822 130 11551	UDZS10B
6115	4822 130 11528	1PS76SB10
6120	4822 130 30621	1N4148
6121	4822 130 30621	1N4148
6122	3198 010 53980	BZX79-B3V9
6130	4822 130 11572	STPS8H100F
6132	9322 171 80685	BZX384-B6V8
6133	4822 130 11397	BAS316
6134	4822 130 11397	BAS316
6141	9322 129 42685	BZM55-C15
6142	4822 130 11528	1PS76SB10
6144	4822 130 11397	BAS316
6147	4822 130 34278	BZX79-B6V8
6148	5322 130 31938	BYV27-200
6149	4822 130 11397	BAS316
6200	9340 548 71115	PDZ33B
6201	9340 255 30135	BAS216
6202	9340 255 30135	BAS216
6400	4822 130 70055	BYV27-400

6405	4822 130 34383	BZX79-B47
6406	4822 130 11397	BAS316
6407	4822 130 11397	BAS316
6408	4822 130 42488	BYD33D
6421	4822 130 10753	BY359X-1500
6422	4822 130 10218	BY229X-800
6442	9322 129 42685	BZM55-C15
6455	4822 130 11397	BAS316
6456	5322 130 34337	BAV99
6457	9322 102 64685	UDZ2.7B
6458	3198 020 55680	BZX384-C5V6
6460	4822 130 41487	BYV95C
6462	9322 127 32682	BYW76-RAS15/10
6464	9322 127 32682	BYW76-RAS15/10
6480	4822 130 42488	BYD33D
6481	9322 129 42685	BZM55-C15
6482	4822 130 11397	BAS316
6483	4822 130 11528	1PS76SB10
6493	4822 130 11528	1PS76SB10
6499	4822 130 11551	UDZS10B
6499	9340 548 58115	PDZ9.1B
6505	4822 130 34281	BZX79-B15
6506	4822 130 10654	BAT254
6509	4822 130 11397	BAS316
6510	4822 130 61219	BZX79-B10
6511	4822 130 11397	BAS316
6512	4822 130 11397	BAS316
6514	5322 130 31932	BZT03-C200
6515	4822 130 33657	BZV85-C6V8
6516	4822 130 11397	BAS316
6517	4822 130 11528	1PS76SB10
6525	3198 010 10640	GBU4K
6530	4822 130 41487	BYV95C
6534	9322 165 72687	DTV1500MFP
6535	4822 130 11572	STPS8H100F
6536	4822 130 11572	STPS8H100F
6537	4822 130 11397	BAS316
6550	4822 130 10218	BY229X-800
6614	4822 130 11528	1PS76SB10
6615	4822 130 11397	BAS316
6616	4822 130 11397	BAS316
6617	4822 130 11397	BAS316
6618	4822 130 11397	BAS316
6619	4822 130 42488	BYD33D
6620	5322 130 31938	BYV27-200
6621	4822 130 42488	BYD33D
6622	5322 130 32296	BZV85-C10
6623	4822 130 11397	BAS316
6624	4822 130 11397	BAS316
6625	4822 130 11397	BAS316
6626	4822 130 11397	BAS316
6627	4822 130 11397	BAS316
6628	4822 130 11397	BAS316
6701	4822 130 11397	BAS316
6745	4822 130 11551	UDZS10B
6950	4822 130 11416	PDZ6.8B
6951	4822 130 11416	PDZ6.8B
6953	4822 130 11416	PDZ6.8B
6954	4822 130 11416	PDZ6.8B
6955	4822 130 11416	PDZ6.8B
6956	4822 130 11416	PDZ6.8B
6957	4822 130 11416	PDZ6.8B
6958	4822 130 11416	PDZ6.8B
6959	4822 130 11416	PDZ6.8B
6960	9340 548 61115	PDZ12B
6961	4822 130 11416	PDZ6.8B
6962	4822 130 11416	PDZ6.8B

7100	4822 130 44568	BC557B
7101	4822 130 40981	BC337-25
7102	4822 130 11417	STP3NB60FP
7103	9322 149 04682	TCET1102
7130	5322 130 60159	BC846B
7131	4822 130 11336	STP16NE06FP
7132	5322 130 60159	BC846B
7133	4822 130 60373	BC856B
7140	5322 130 60159	BC846B
7141	4822 130 11336	STP16NE06FP
7408	5322 130 44647	BC368
7409	5322 130 60159	BC846B
7421	9340 210 30127	BU2520DX
7440	4822 209 70672	LM358N
7441	4822 130 60373	BC856B
7442	4822 130 60373	BC856B
7443	5322 130 60159	BC846B
7445	5322 130 60159	BC846B
7450	5322 209 61472	LM393M
7455	4822 209 73852	PMBT2369
7480	4822 130 11417	STP3NB60FP
7482	4822 130 11418	TCDT1102G
7486	5322 130 60159	BC846B
7487	5322 130 60159	BC846B
7501	5322 130 60159	BC846B
7502	4822 130 40959	BC547B
7504	9322 126 65687	STP5NB60FP
7506	4822 209 14933	TL431IZ
7507	9322 149 04682	TCET1102
7528	4822 130 40981	BC337-25
7529	4822 130 44461	BC546B
7530	5322 130 60159	BC846B
7611	5322 130 60159	BC846B
7612	5322 130 60159	BC846B
7613	4822 209 81397	TL431CLPST
7614	5322 130 60159	BC846B
7620	4822 209 90009	TDA8177
7641	5322 130 60159	BC846B
7652	5322 130 60159	BC846B
7653	5322 130 60159	BC846B
7654	4822 130 60373	BC856B
7680	4822 209 60956	TDA7052
7681	5322 130 60159	BC846B
7682	5322 130 44647	BC368
7700	9322 163 86682	TDA7490L
7701	5322 130 60159	BC846B
7702	9322 163 86682	TDA7490L
7703	5322 130 60159	BC846B
7704	5322 130 60159	BC846B
7705	5322 130 60159	BC846B
7706	4822 130 60373	BC856B
7707	5322 130 60159	BC846B
7902	5322 130 60159	BC846B
7908	5322 130 60159	BC846B
7910	9322 166 03682	LD1085V36
7911	4822 209 72042	L78L05ACZ
7912	5322 209 86445	LM7805CT
8000	3104 311 03272	EHT cable

Small signal board [B]

Various

1001	2422 543 89022	Crystal 6MHz CX-5F
1301	2422 540 98456	Crystal 12MHz CSTCV12.MTJ
1305	2422 543 01184	Crystal 4.433MHz HC49/U A
1308	2422 543 01183	Crystal 3.579MHz HC49/U A
1402	2422 025 16966	5p male
1403	2422 086 11031	Fuse 500mA 63V
1407	2422 549 44324	Filter 5.74MHz TPWCC04BS
1408	2422 549 44372	Saw filter 38.9MHz OFWK3953L
1409	2422 549 44369	Saw filter 38MHz 9 OFWK9656L
1651	2422 543 89019	Crystal 18.432MHz CX-5F
1680	2422 025 16961	6p male
1702	2422 540 98456	Crystal 12MHz CSTCV12
8402	3104 311 04711	5p 180mm
8680	3104 311 04991	6p 400mm

⊣⊢

2001	2222 867 15339	33pF 5% 50V
2002	4822 126 11669	27pF
2003	4822 126 13879	220nF 20% 16V
2004	4822 126 13879	220nF 20% 16V
2005	2238 586 59812	100nF 50V
2006	2238 586 59812	100nF 50V
2007	2238 586 59812	100nF 50V
2008	2238 586 59812	100nF 50V
2010	4822 126 11785	47pF 5% 50V
2011	4822 126 11785	47pF 5% 50V
2012	4822 126 11785	47pF 5% 50V
2013	4822 124 12095	100µF 20% 16V
2016	4822 124 12095	100µF 20% 16V
2017	2238 586 59812	100nF 50V
2019	2238 586 59812	100nF 50V
2020	4822 126 13883	220pF 5% 50V
2022	2238 586 59812	100nF 50V
2023	2238 586 59812	100nF 50V
2024	2238 586 59812	100nF 50V
2025	2238 586 59812	100nF 50V
2026	2238 586 59812	100nF 50V
2027	2238 586 59812	100nF 50V
2028	2238 586 59812	100nF 50V
2029	2238 586 59812	100nF 50V
2031	2238 586 59812	100nF 50V
2033	4822 126 14226	82pF 5% 50V
2034	4822 126 14226	82pF 5% 50V
2035	4822 126 14226	82pF 5% 50V
2036	4822 126 14226	82pF 5% 50V
2037	4822 126 14226	82pF 5% 50V
2038	2238 586 59812	100nF 50V
2039	2238 586 59812	100nF 50V
2040	2238 586 59812	100nF 50V
2302	2238 586 59812	100nF 50V
2303	2020 552 96448	16V 1µF 10%
2304	4822 122 33741	10pF 10% 50V
2305	2238 586 59812	100nF 50V
2306	4822 126 13881	470pF 5% 50V
2307	2238 586 59812	100nF 50V
2308	4822 122 33741	10pF 10% 50V
2312	2020 552 96659	1206 33nF 5% 50V
2313	4822 121 70159	0.1µF 16V
2314	4822 124 12095	100µF 20% 16V
2315	2238 586 59812	100nF 50V
2316	2238 586 59812	100nF 50V
2317	2020 552 96448	16V 1µF 10%
2318	4822 126 14494	22nF 10% 25V
2319	4822 126 14247	1.5nF 50V
2320	4822 122 33741	10pF 10% 50V
2321	2238 586 59812	100nF 50V
2322	2238 586 59812	100nF 50V
2323	2238 586 59812	100nF 50V
2324	5322 126 11583	10nF 10% 50V
2325	2238 586 59812	100nF 50V
2326	5322 126 11583	10nF 10% 50V
2328	4822 122 33761	22pF 5% 50V
2329	2238 586 59812	100nF 50V
2330	2238 586 59812	100nF 50V
2331	2238 586 59812	100nF 50V
2332	2238 586 59812	100nF 50V
2333	5322 126 14103	2.2µF 20% 10V
2334	5322 126 14103	2.2µF 20% 10V
2336	5322 126 14103	2.2µF 20% 10V
2340	4822 124 12095	100µF 20% 16V
2343	2238 586 59812	100nF 50V
2350	2238 586 59812	100nF 50V
2351	2238 586 59812	100nF 50V
2352	2238 586 59812	100nF 50V
2353	2238 586 59812	100nF 50V
2354	2238 586 59812	100nF 50V
2356	2238 586 59812	100nF 50V
2357	2238 586 59812	100nF 50V
2358	5322 126 11579	3.3nF 10% 63V
2359	4822 122 33752	15pF 5% 50V
2360	3198 016 31280	1.2pF 50V
2361	3198 016 31280	1.2pF 50V
2362	4822 126 11663	12pF
2363	4822 126 13881	470pF 5% 50V
2365	2238 586 59812	100nF 50V
2366	2238 586 59812	100nF 50V
2367	2238 586 59812	100nF 50V
2368	2238 586 59812	100nF 50V
2369	2238 586 59812	100nF 50V
2370	2238 586 59812	100nF 50V
2371	4822 126 13193	4.7nF 10% 63V
2372	4822 126 14043	1µF 20% 16V
2373	2238 586 59812	100nF 50V
2374	5322 126 14103	2.2µF 20% 10V
2375	4822 126 14494	22nF 10% 25V
2376	2238 586 59812	100nF 50V
2377	4822 124 12095	100µF 20% 16V
2378	2238 586 59812	100nF 50V
2384	2238 586 59812	100nF 50V
2385	2238 586 59812	100nF 50V
2386	4822 126 13883	220pF 5% 50V
2390	2238 586 59812	100nF 50V
2391	2238 586 59812	100nF 50V
2392	4822 126 13193	4.7nF 10% 63V
2394	5322 126 14103	2.2µF 20% 10V
2404	4822 126 14043	1µF 20% 16V
2405	4822 126 13193	4.7nF 10% 63V
2406	4822 126 13883	220pF 5% 50V
2407	4822 126 13956	68pF 5% 63V
2408	3198 016 32780	2.7pF 50V
2409	5322 126 14103	2.2µF 20% 10V
2411	2238 586 59812	100nF 50V
2412	4822 126 13193	4.7nF 10% 63V
2417	3198 017 44740	470nF 10V
2418	3198 016 35680	5.6pF 50V
2420	4822 122 33753	150pF 5% 50V
2422	2238 586 59812	100nF 50V
2424	2238 586 59812	100nF 50V
2425	4822 124 12095	100µF 20% 16V
2429	2238 586 59812	100nF 50V
2431	2238 586 59812	100nF 50V
2501	4822 126 11785	47pF 5% 50V
2502	4822 126 14107	330nF 20-80% 25V
2503	4822 126 14107	330nF 20-80% 25V
2504	4822 126 14107	330nF 20-80% 25V
2505	4822 126 14107	330nF 20-80% 25V
2506	4822 126 14107	330nF 20-80% 25V
2507	4822 126 14107	330nF 20-80% 25V
2508	4822 124 12095	100µF 20% 16V
2509	4822 124 23002	10µF 16V
2510	2020 552 96448	16V 1µF 10%

2511	2020 552 96448	16V 1µF 10%
2512	4822 126 13879	220nF 20% 16V
2515	2020 552 94427	100pF 5% 50V
2520	2238 586 59812	100nF 50V
2521	2238 586 59812	100nF 50V
2522	4822 126 13881	470pF 5% 50V
2523	3198 016 31020	1nF 25V
2524	2238 586 59812	100nF 50V
2525	4822 126 13881	470pF 5% 50V
2526	3198 016 31020	1nF 25V
2528	5322 126 14103	2.2µF 20% 10V
2529	4822 126 14472	1µF 10% 10V
2530	4822 126 14472	1µF 10% 10V
2531	2020 552 94427	100pF 5% 50V
2532	2020 552 94427	100pF 5% 50V
2546	4822 124 23002	10µF 16V
2547	4822 124 23002	10µF 16V
2548	4822 124 23002	10µF 16V
2549	4822 124 23002	10µF 16V
2550	4822 126 14241	330pF 50V
2551	5322 126 11579	3.3nF 10% 63V
2552	4822 126 13881	470pF 5% 50V
2553	4822 126 13881	470pF 5% 50V
2554	4822 126 13881	470pF 5% 50V
2555	4822 126 13881	470pF 5% 50V
2562	3198 016 31020	1nF 25V
2563	3198 016 31020	1nF 25V
2564	3198 016 31020	1nF 25V
2565	3198 016 31020	1nF 25V
2566	3198 016 31020	1nF 25V
2567	3198 016 31020	1nF 25V
2568	3198 016 31020	1nF 25V
2569	3198 016 31020	1nF 25V
2570	3198 016 31020	1nF 25V
2571	2020 552 94427	100pF 5% 50V
2572	3198 016 31020	1nF 25V
2573	3198 016 31020	1nF 25V
2574	3198 016 31020	1nF 25V
2575	3198 016 31020	1nF 25V
2576	3198 016 31020	1nF 25V
2577	3198 016 31020	1nF 25V
2578	3198 016 31020	1nF 25V
2579	3198 016 31020	1nF 25V
2580	3198 016 31020	1nF 25V
2581	3198 016 31020	1nF 25V
2582	3198 016 31020	1nF 25V
2583	3198 016 31020	1nF 25V
2592	5322 126 11578	1nF 10% 50V
2593	3198 016 31020	1nF 25V
2594	3198 016 31020	1nF 25V
2595	3198 016 31020	1nF 25V
2600	2020 552 96448	16V 1µF 10%
2601	2020 552 96448	16V 1µF 10%
2602	2020 552 96448	16V 1µF 10%
2603	2020 552 96448	16V 1µF 10%
2604	2020 552 96448	16V 1µF 10%
2609	3198 016 31020	1nF 25V
2610	4822 126 14238	2.2nF 50V
2611	3198 016 31020	1nF 25V
2629	4822 126 14107	330nF 20-80% 25V
2630	5322 126 14103	2.2µF 20% 10V
2632	4822 126 14107	330nF 20-80% 25V
2634	3198 016 31020	1nF 25V
2637	4822 126 14107	330nF 20-80% 25V
2640	4822 126 13879	220nF 20% 16V
2643	4822 126 14107	330nF 20-80% 25V
2644	3198 016 31020	1nF 25V
2645	4822 126 14107	330nF 20-80% 25V
2646	5322 126 14103	2.2µF 20% 10V
2649	5322 126 14103	2.2µF 20% 10V
2651	2238 586 59812	100nF 50V
2652	4822 126 11785	47pF 5% 50V
2653	4822 126 14107	330nF 20-80% 25V
2654	4822 126 13881	470pF 5% 50V
2659	4822 126 13881	470pF 5% 50V
2660	4822 126 13881	470pF 5% 50V
2661	4822 126 14107	330nF 20-80% 25V
2662	4822 126 14107	330nF 20-80% 25V
2663	4822 126 13881	470pF 5% 50V
2664	4822 126 13881	470pF 5% 50V
2665	4822 124 12095	100µF 20% 16V
2666	4822 124 12095	100µF 20% 16V
2667	3198 016 33380	3.3pF 50V
2668	3198 016 33380	3.3pF 50V
2670	2238 586 59812	100nF 50V
2673	3198 016 31020	1nF 25V
2674	3198 016 31020	1nF 25V
2677	4822 124 23002	10µF 16V
2678	4822 124 23002	10µF 16V
2679	2238 586 59812	100nF 50V
2680	4822 124 23002	10µF 16V
2681	2238 586 59812	100nF 50V
2682	4822 124 23002	10µF 16V
2686	3198 016 31020	1nF 25V
2687	3198 016 31020	1nF 25V
2690	2238 586 59812	100nF 50V
2691	2238 586 59812	100nF 50V
2693	4822 126 13883	220pF 5% 50V
2694	3198 016 31020	1nF 25V
2695	4822 124 12095	100µF 20% 16V
2697	2238 586 59812	100nF 50V
2698	5322 126 14103	2.2µF 20% 10V
2699	5322 126 14103	2.2µF 20% 10V
2701	4822 126 11663	12pF
2704	4822 126 11663	12pF
2707	4822 126 11663	12pF
2709	2238 586 59812	100nF 50V
2710	2238 586 59812	100nF 50V
2711	2238 586 59812	100nF 50V
2712	2238 586 59812	100nF 50V
2713	4822 122 33761	22pF 5% 50V
2714	4822 122 33761	22pF 5% 50V
2716	2238 586 59812	100nF 50V
2717	4822 126 11663	12pF
2718	4822 122 33752	15pF 5% 50V
2719	4822 122 33752	15pF 5% 50V
2720	4822 122 33752	15pF 5% 50V
2721	2020 552 94427	100pF 5% 50V
2722	2020 552 94427	100pF 5% 50V
2723	4822 126 14225	56pF 5% 50V
2724	2020 552 94427	100pF 5% 50V
2725	4822 126 11663	12pF
2726	4822 126 11669	27pF
2727	4822 126 11663	12pF
2728	2020 021 91554	10µF 20% 16V
2729	2238 586 59812	100nF 50V
2730	2020 021 91557	100µF 20% 16V
2731	2238 586 59812	100nF 50V
2732	2238 586 59812	100nF 50V
2733	2238 586 59812	100nF 50V
2734	2238 586 59812	100nF 50V
2735	2238 586 59812	100nF 50V
2736	4822 126 11669	27pF
2737	4822 126 11663	12pF
2738	4822 126 11663	12pF
2739	4822 126 11669	27pF
2740	4822 126 14494	22nF 10% 25V
2741	4822 126 14494	22nF 10% 25V
2742	4822 126 14494	22nF 10% 25V
2743	2238 586 59812	100nF 50V
2744	2238 586 59812	100nF 50V
2745	2238 586 59812	100nF 50V
2746	2238 586 59812	100nF 50V
2747	2238 586 59812	100nF 50V
2748	2238 586 59812	100nF 50V
2749	2020 021 91554	10µF 20% 16V
2750	2238 586 59812	100nF 50V
2751	2238 586 59812	100nF 50V
2752	2238 586 59812	100nF 50V
2753	2238 586 59812	100nF 50V
2754	2238 586 59812	100nF 50V
2755	2238 586 59812	100nF 50V
2756	2238 586 59812	100nF 50V
2757	4822 126 14494	22nF 10% 25V
2760	2238 586 59812	100nF 50V
2761	2238 586 59812	100nF 50V
2762	2238 586 59812	100nF 50V
2763	2238 586 59812	100nF 50V
2764	2238 586 59812	100nF 50V
2765	2238 586 59812	100nF 50V
2766	2238 586 59812	100nF 50V
2767	2238 586 59812	100nF 50V
2768	2238 586 59812	100nF 50V
2769	2238 586 59812	100nF 50V
2770	2020 021 91554	10µF 20% 16V
2771	2238 586 59812	100nF 50V
2772	2020 021 91557	100µF 20% 16V
2773	2238 586 59812	100nF 50V
2774	2238 586 59812	100nF 50V
2775	2238 586 59812	100nF 50V
2776	2238 586 59812	100nF 50V
2777	2238 586 59812	100nF 50V
2778	2238 586 59812	100nF 50V
2779	2238 586 59812	100nF 50V
2780	2238 586 59812	100nF 50V
2781	2238 586 59812	100nF 50V
2782	2238 586 59812	100nF 50V
2783	2238 586 59812	100nF 50V
2784	2238 586 59812	100nF 50V
2785	2238 586 59812	100nF 50V
2786	2238 586 59812	100nF 50V
2787	2238 586 59812	100nF 50V
2788	2238 586 59812	100nF 50V
2789	2238 586 59812	100nF 50V
2790	2238 586 59812	100nF 50V
2791	2238 586 59812	100nF 50V
2792	2020 021 91554	10µF 20% 16V
2793	2238 586 59812	100nF 50V
2794	2020 021 91554	10µF 20% 16V
2795	2238 586 59812	100nF 50V
2796	2238 586 59812	100nF 50V
2797	2238 586 59812	100nF 50V
2798	2238 586 59812	100nF 50V
2799	2238 586 59812	100nF 50V
2800	2238 586 59812	100nF 50V
2801	2238 586 59812	100nF 50V
2802	2238 586 59812	100nF 50V
2803	2238 586 59812	100nF 50V
2804	2238 586 59812	100nF 50V
2805	2238 586 59812	100nF 50V
2807	2238 586 59812	100nF 50V
2808	2020 021 91554	10µF 20% 16V
2809	2238 586 59812	100nF 50V
2810	2238 586 59812	100nF 50V
2811	2238 586 59812	100nF 50V
2812	2238 586 59812	100nF 50V
2813	2238 586 59812	100nF 50V
2814	2238 586 59812	100nF 50V
2815	4822 126 14223	2.2pF 50V
2816	4822 126 14223	2.2pF 50V
2817	2238 586 59812	100nF 50V
2818	4822 126 14223	2.2pF 50V
2819	2238 586 59812	100nF 50V
2820	2238 586 59812	100nF 50V
2821	2238 586 59812	100nF 50V
2822	2238 586 59812	100nF 50V
2823	5322 126 11578	1nF 10% 50V
2824	5322 126 11578	1nF 10% 50V
2825	2238 586 59812	100nF 50V
2826	2238 586 59812	100nF 50V
2827	2238 586 59812	100nF 50V
2828	2238 586 59812	100nF 50V
2829	2238 586 59812	100nF 50V
2830	2238 586 59812	100nF 50V
2831	4822 126 13956	68pF 5% 63V
2832	2238 586 59812	100nF 50V
2833	2238 586 59812	100nF 50V
2835	2238 586 59812	100nF 50V
2838	2238 586 59812	100nF 50V
2843	2238 586 59812	100nF 50V
2845	2238 586 59812	100nF 50V
2846	2238 586 59812	100nF 50V
2847	2238 586 59812	100nF 50V
2848	2238 586 59812	100nF 50V
2851	2238 586 59812	100nF 50V
2853	2238 586 59812	100nF 50V
2854	2238 586 59812	100nF 50V
2855	2238 586 59812	100nF 50V
2857	2238 586 59812	100nF 50V
2859	2238 586 59812	100nF 50V
2860	2238 586 59812	100nF 50V
2861	2238 586 59812	100nF 50V
2864	2238 586 59812	100nF 50V
2865	2238 586 59812	100nF 50V
2866	2238 586 59812	100nF 50V
2867	2238 586 59812	100nF 50V
2870	2020 021 91554	10µF 20% 16V
2871	2020 021 91554	10µF 20% 16V
2872	2238 586 59812	100nF 50V
2874	2020 021 91554	10µF 20% 16V
2875	2020 021 91554	10µF 20% 16V
2876	2238 586 59812	100nF 50V
2880	2020 021 91557	100µF 20% 16V
2881	4822 126 11669	27pF
2884	2238 586 59812	100nF 50V
2885	4822 126 11663	12pF
2886	2238 586 59812	100nF 50V
2887	2238 586 59812	100nF 50V
2888	2238 586 59812	100nF 50V
2889	2238 586 59812	100nF 50V
2890	2238 586 59812	100nF 50V
2891	2238 586 59812	100nF 50V
2892	2238 586 59812	100nF 50V
2893	2238 586 59812	100nF 50V
2894	2238 586 59812	100nF 50V
2895	2238 586 59812	100nF 50V
2896	2238 586 59812	100nF 50V
2897	2238 586 59812	100nF 50V
2898	2238 586 59812	100nF 50V
2899	2238 586 59812	100nF 50V
2908	2238 586 59812	100nF 50V
2909	2238 586 59812	100nF 50V
2910	2238 586 59812	100nF 50V
2911	2238 586 59812	100nF 50V
2912	2238 586 59812	100nF 50V

3001	4822 051 30472	4k7 5% 62mW
3002	4822 051 30472	4k7 5% 62mW
3003	4822 117 13525	24k 1% 620mW

3006	4822 051 30471	470Ω 5% 62mW
3007	3198 031 14710	4X470Ω
3008	4822 117 13526	150Ω 5% 630mW
3009	4822 051 30689	68Ω 5% 63mW
3011	4822 051 30471	470Ω 5% 62mW
3012	3198 031 11010	4X100Ω
3013	4822 051 30103	10k 5% 62mW
3014	4822 051 30682	6k8 5% 62mW
3015	4822 051 30474	470k 5% 62mW
3016	4822 051 30152	1k5 5% 62mW
3017	4822 051 30472	4k7 5% 62mW
3018	4822 051 30103	10k 5% 62mW
3019	4822 051 30472	4k7 5% 62mW
3020	4822 051 30103	10k 5% 62mW
3021	4822 051 30103	10k 5% 62mW
3024	4822 051 30273	27k 5% 62mW
3025	4822 051 30221	220Ω 5% 62mW
3026	4822 051 30472	4k7 5% 62mW
3027	4822 117 12925	47k 1% 63mW
3029	4822 051 30103	10k 5% 62mW
3031	4822 051 30103	10k 5% 62mW
3033	4822 051 30103	10k 5% 62mW
3034	3198 031 11010	4X100Ω
3035	3198 031 11010	4X100Ω
3039	4822 051 30181	180Ω 5% 62mW
3040	4822 051 30472	4k7 5% 62mW
3041	4822 051 30472	4k7 5% 62mW
3042	4822 051 30472	4k7 5% 62mW
3044	4822 051 30272	2k7 5% 62mW
3048	3198 031 11010	4X100Ω
3049	3198 031 11010	4X100Ω 5%
3050	3198 031 11010	4X100Ω 5%
3051	3198 031 11010	4X100Ω 5%
3052	3198 031 11010	4X100Ω 5%
3053	4822 051 30101	100Ω 5% 62mW
3054	3198 031 11010	4X100Ω 5%
3055	3198 031 11010	4X100Ω 5%
3056	3198 031 11010	4X100Ω 5%
3057	3198 031 11010	4X100Ω 5%
3059	2322 704 66201	RST 620Ω 1%
3061	4822 051 30103	10k 5% 62mW
3062	4822 051 30103	10k 5% 62mW
3064	3198 031 11010	4X100Ω
3065	4822 051 30472	4k7 5% 62mW
3066	4822 117 12925	47k 1% 63mW
3067	4822 051 30474	470k 5% 62mW
3068	4822 051 30272	2k7 5% 62mW
3069	4822 051 30272	2k7 5% 62mW
3073	3198 031 14710	4X470Ω
3074	3198 031 14710	4X470Ω
3076	3198 031 14710	4X470Ω
3078	3198 031 14710	4X470Ω
3079	4822 051 30472	4k7 5% 62mW
3080	4822 051 30472	4k7 5% 62mW
3081	4822 051 30008	Jumper
3088	4822 051 30472	4k7 5% 62mW
3090	3198 031 14710	4X470Ω
3093	4822 051 30103	10k 5% 62mW
3094	4822 117 12925	47k 1% 63mW
3095	4822 117 12925	47k 1% 63mW
3096	4822 117 12925	47k 1% 63mW
3097	4822 051 30008	Jumper
3099	3198 031 14710	4X470Ω
3301	4822 117 13632	100k 1% 620mW
3302	4822 051 30102	1k 5% 62mW
3303	4822 117 13632	100k 1% 620mW
3304	2322 750 63908	3Ω9 5%
3306	4822 051 30221	220Ω 5% 62mW
3307	4822 051 30183	18k 5% 62mW
3308	4822 051 20154	150k 5% 0.1W
3310	4822 051 30563	56k 5% 62mW
3311	4822 117 13632	100k 1% 620mW
3312	4822 117 13632	100k 1% 620mW
3313	4822 117 13632	100k 1% 620mW
3314	4822 051 30103	10k 5% 62mW
3315	4822 051 30102	1k 5% 62mW
3316	4822 117 10834	47k 1% 0.1W
3317	4822 051 30221	220Ω 5% 62mW
3318	4822 051 30102	1k 5% 62mW
3319	4822 051 30221	220Ω 5% 62mW
3320	4822 051 30101	100Ω 5% 62mW
3321	4822 051 30101	100Ω 5% 62mW
3322	4822 051 10102	1k 2% 0.25W
3324	4822 051 30472	4k7 5% 62mW
3325	4822 117 13632	100k 1% 620mW
3327	4822 117 13632	100k 1% 620mW
3328	4822 051 30393	39k 5% 62mW
3329	4822 117 13568	6Ω8 5%
3331	4822 051 30102	1k 5% 62mW
3333	4822 051 30102	1k 5% 62mW
3334	4822 051 30102	1k 5% 62mW
3336	4822 051 30102	1k 5% 62mW
3340	4822 051 30101	100Ω 5% 62mW
3341	4822 051 30101	100Ω 5% 62mW
3342	4822 051 30101	100Ω 5% 62mW
3343	4822 051 20683	68k 5% 0.1W
3344	4822 051 30222	2k2 5% 62mW
3345	4822 051 30103	10k 5% 62mW
3346	4822 051 30333	33k 5% 62mW
3347	4822 051 30223	22k 5% 62mW
3348	4822 051 30222	2k2 5% 62mW
3349	4822 051 30472	4k7 5% 62mW
3350	4822 051 30102	1k 5% 62mW
3351	4822 051 30103	10k 5% 62mW
3352	4822 117 13632	100k 1% 620mW
3353	4822 051 30103	10k 5% 62mW
3354	4822 051 30222	2k2 5% 62mW
3358	4822 117 12903	1k8 1% 63mW
3359	4822 117 13632	100k 1% 620mW
3362	4822 051 30684	680k 5% 62mW
3363	4822 051 30102	1k 5% 62mW
3364	4822 051 30103	10k 5% 62mW
3365	4822 051 30103	10k 5% 62mW
3366	4822 051 30221	220Ω 5% 62mW
3367	4822 051 30221	220Ω 5% 62mW
3368	3198 021 32250	RST 2.2M 5%
3370	4822 051 30101	100Ω 5% 62mW
3371	4822 051 30479	47Ω 5% 62mW
3372	4822 051 30471	470Ω 5% 62mW
3373	4822 051 30008	Jumper
3374	4822 051 30008	Jumper
3375	4822 051 30008	Jumper
3376	4822 051 30101	100Ω 5% 62mW
3377	4822 051 30101	100Ω 5% 62mW
3378	4822 051 30153	15k 5% 62mW
3379	4822 051 30008	Jumper
3380	4822 051 30101	100Ω 5% 62mW
3382	4822 051 30561	560Ω 5% 62mW
3385	4822 051 30471	470Ω 5% 62mW
3386	4822 051 30223	22k 5% 62mW
3390	4822 051 30221	220Ω 5% 62mW
3391	4822 051 30472	4k7 5% 62mW
3393	4822 117 13632	100k 1% 620mW
3394	4822 051 30472	4k7 5% 62mW
3400	4822 117 11152	4Ω7 5%
3402	2322 750 63908	3Ω9 5%
3403	4822 051 30101	100Ω 5% 62mW
3404	4822 051 30561	560Ω 5% 62mW
3405	4822 051 30102	1k 5% 62mW
3406	2322 702 60279	27Ω 5%
3408	4822 051 30101	100Ω 5% 62mW
3411	4822 051 30272	2k7 5% 62mW
3412	4822 051 30102	1k 5% 62mW
3414	4822 051 30472	4k7 5% 62mW
3415	4822 051 30222	2k2 5% 62mW
3418	4822 051 30391	390Ω 5% 62mW
3419	4822 051 30339	33Ω 5% 62mW
3435	4822 051 30472	4k7 5% 62mW
3436	4822 051 30221	220Ω 5% 62mW
3437	4822 051 30471	470Ω 5% 62mW
3439	4822 051 30471	470Ω 5% 62mW
3441	4822 051 30562	5k6 5% 63mW
3445	4822 051 30271	270Ω 5% 62mW
3446	4822 051 30101	100Ω 5% 62mW
3459	4822 051 30222	2k2 5% 62mW
3460	4822 051 30332	3k3 5% 62mW
3461	4822 117 12903	1k8 1% 63mW
3462	4822 117 11817	1k2 1% 62mW
3463	4822 051 30472	4k7 5% 62mW
3465	4822 051 30333	33k 5% 62mW
3468	4822 117 13632	100k 1% 620mW
3472	4822 051 30223	22k 5% 62mW
3500	4822 051 30153	15k 5% 62mW
3501	4822 051 20121	120Ω 5% 0.1W
3502	4822 051 20121	120Ω 5% 0.1W
3504	4822 051 30333	33k 5% 62mW
3505	4822 051 30153	15k 5% 62mW
3506	4822 051 20121	120Ω 5% 0.1W
3507	4822 051 20121	120Ω 5% 0.1W
3509	4822 051 30333	33k 5% 62mW
3510	4822 117 12925	47k 1% 63mW
3511	4822 117 13632	100k 1% 620mW
3512	4822 051 30154	150k 5% 62mW
3513	4822 117 12889	270k 1% 63mW
3514	4822 117 12925	47k 1% 63mW
3515	4822 117 13632	100k 1% 620mW
3516	4822 051 30392	3k9 5% 63mW
3519	4822 051 30103	10k 5% 62mW
3520	4822 117 12925	47k 1% 63mW
3521	4822 117 13632	100k 1% 620mW
3522	4822 117 13632	100k 1% 620mW
3523	4822 117 13632	100k 1% 620mW
3524	4822 117 13632	100k 1% 620mW
3525	4822 051 30684	680k 5% 62mW
3526	4822 051 30105	1M 5% 62mW
3527	4822 051 30221	220Ω 5% 62mW
3528	4822 051 30103	10k 5% 62mW
3529	4822 051 30103	10k 5% 62mW
3530	4822 051 30103	10k 5% 62mW
3531	4822 117 12902	8k2 1% 63mW
3532	4822 051 30102	1k 5% 62mW
3533	4822 051 30103	10k 5% 62mW
3540	4822 051 30103	10k 5% 62mW
3544	4822 117 12925	47k 1% 63mW
3545	4822 117 11817	1k2 1% 62mW
3546	4822 051 30102	1k 5% 62mW
3547	4822 117 12925	47k 1% 63mW
3551	4822 051 30102	1k 5% 62mW
3552	4822 051 30103	10k 5% 62mW
3553	4822 051 30223	22k 5% 62mW
3554	4822 051 30223	22k 5% 62mW
3555	4822 051 30223	22k 5% 62mW
3556	4822 051 30101	100Ω 5% 62mW
3557	4822 051 30101	100Ω 5% 62mW
3558	4822 051 30101	100Ω 5% 62mW
3559	4822 051 30101	100Ω 5% 62mW
3560	4822 051 30101	100Ω 5% 62mW
3561	4822 051 30101	100Ω 5% 62mW
3562	4822 051 30101	100Ω 5% 62mW
3563	4822 051 30101	100Ω 5% 62mW
3564	4822 051 30101	100Ω 5% 62mW
3567	4822 051 30101	100Ω 5% 62mW
3568	4822 051 30101	100Ω 5% 62mW
3569	4822 051 30101	100Ω 5% 62mW
3570	4822 051 30101	100Ω 5% 62mW
3571	4822 051 30101	100Ω 5% 62mW
3572	4822 051 30101	100Ω 5% 62mW
3573	4822 051 30101	100Ω 5% 62mW
3574	4822 051 30101	100Ω 5% 62mW
3575	4822 051 30101	100Ω 5% 62mW
3576	4822 051 30272	2k7 5% 62mW
3577	4822 051 30101	100Ω 5% 62mW
3578	4822 051 30103	10k 5% 62mW
3579	4822 051 30103	10k 5% 62mW
3601	4822 051 30223	22k 5% 62mW
3602	4822 051 30124	120k 5% 62mW
3603	4822 117 12891	220k 1%
3604	4822 051 30124	120k 5% 62mW
3605	4822 117 12891	220k 1%
3606	4822 051 30124	120k 5% 62mW
3607	4822 117 12891	220k 1%
3608	4822 051 30124	120k 5% 62mW
3609	4822 117 12891	220k 1%
3612	4822 117 12925	47k 1% 63mW
3613	4822 117 12925	47k 1% 63mW
3614	4822 117 12925	47k 1% 63mW
3615	4822 117 12925	47k 1% 63mW
3616	4822 051 30272	2k7 5% 62mW
3624	4822 117 11817	1k2 1% 62mW
3626	4822 051 30154	150k 5% 62mW
3627	4822 051 30103	10k 5% 62mW
3628	4822 051 30223	22k 5% 62mW
3630	4822 051 30563	56k 5% 62mW
3634	4822 051 30121	120Ω 5% 62mW
3636	4822 051 30271	270Ω 5% 62mW
3637	4822 117 12864	82k 5% 0.6W
3639	4822 051 30102	1k 5% 62mW
3640	4822 051 30101	100Ω 5% 62mW
3641	4822 051 30101	100Ω 5% 62mW
3642	4822 051 30101	100Ω 5% 62mW
3643	4822 051 30101	100Ω 5% 62mW
3644	4822 117 11152	4Ω7 5%
3653	4822 051 30008	Jumper
3654	4822 051 30008	Jumper
3655	4822 051 30101	100Ω 5% 62mW
3656	4822 051 30101	100Ω 5% 62mW
3657	4822 051 30563	56k 5% 62mW
3658	4822 051 30154	150k 5% 62mW
3659	4822 051 30154	150k 5% 62mW
3663	4822 051 30181	180Ω 5% 62mW
3664	4822 051 30102	1k 5% 62mW
3666	4822 051 30154	150k 5% 62mW
3667	4822 117 12864	82k 5% 0.6W
3668	4822 051 30563	56k 5% 62mW
3669	4822 051 30271	270Ω 5% 62mW
3670	4822 051 30102	1k 5% 62mW
3671	4822 117 11817	1k2 1% 62mW
3673	4822 051 30103	10k 5% 62mW
3675	4822 051 30181	180Ω 5% 62mW
3676	4822 117 13632	100k 1% 620mW
3677	4822 117 13632	100k 1% 620mW
3680	4822 117 11817	1k2 1% 62mW
3681	4822 051 30154	150k 5% 62mW
3682	4822 051 30102	5% 62mW
3683	4822 051 30223	22k 5% 62mW
3684	4822 051 30008	Jumper
3685	4822 051 30008	Jumper
3688	4822 051 30008	Jumper
3689	4822 051 30008	Jumper
3692	4822 051 30008	Jumper
3693	4822 051 30008	Jumper
3698	4822 117 11817	1k2 1% 62mW

3699	2322 702 60184	180k 5%
3703	5322 117 13047	330Ω 1% 63mW
3704	5322 117 13047	330Ω 1% 63mW
3705	5322 117 13047	330Ω 1% 63mW
3709	4822 051 30101	100Ω 5% 62mW
3710	4822 051 30101	100Ω 5% 62mW
3711	4822 117 12925	47k 1% 63mW
3712	4822 117 12925	47k 1% 63mW
3713	4822 051 30181	180Ω 5% 62mW
3714	4822 051 30181	180Ω 5% 62mW
3715	4822 051 30181	180Ω 5% 62mW
3716	4822 117 13632	100k 1% 620mW
3717	4822 117 13632	100k 1% 620mW
3718	4822 117 13632	100k 1% 620mW
3719	4822 051 30332	3k3 5% 62mW
3720	4822 051 30103	10k 5% 62mW
3721	4822 117 12917	1Ω 5% 62mW
3725	4822 051 30332	3k3 5% 62mW
3726	4822 117 11817	1k2 1% 62mW
3727	4822 051 30151	150Ω 5% 62mW
3728	4822 051 30151	150Ω 5% 62mW
3729	4822 051 30689	68Ω 5% 63mW
3730	4822 051 30681	680Ω 5% 62mW
3731	4822 051 30472	4k7 5% 62mW
3733	4822 051 30472	4k7 5% 62mW
3735	4822 117 12917	1Ω 5% 62mW
3736	4822 051 30101	100Ω 5% 62mW
3737	4822 051 30102	1k 5% 62mW
3738	4822 051 30102	1k 5% 62mW
3739	4822 051 30153	15k 5% 62mW
3740	4822 051 30102	1k 5% 62mW
3741	4822 051 30183	18k 5% 62mW
3742	4822 051 30183	18k 5% 62mW
3744	4822 051 30222	2k2 5% 62mW
3745	4822 051 30102	1k 5% 62mW
3746	4822 051 30392	3k9 5% 63mW
3747	4822 051 30154	150k 5% 62mW
3748	4822 117 12891	220k 1%
3749	4822 051 30392	3k9 5% 63mW
3750	4822 051 30332	3k3 5% 62mW
3751	4822 051 30472	4k7 5% 62mW
3752	4822 117 12917	1Ω 5% 62mW
3753	4822 117 12917	1Ω 5% 62mW
3754	4822 051 30101	100Ω 5% 62mW
3755	4822 051 30472	4k7 5% 62mW
3756	4822 117 12902	8k2 1% 63mW
3757	4822 051 30479	47Ω 5% 62mW
3758	4822 051 30472	4k7 5% 62mW
3759	4822 051 30221	220Ω 5% 62mW
3762	4822 051 30101	100Ω 5% 62mW
3763	4822 117 12139	22Ω 5% 62mW
3764	4822 051 30109	10Ω 5% 62mW
3771	4822 117 12971	15Ω 5% 620mW
3772	4822 117 12971	15Ω 5% 620mW
3773	4822 117 12925	47k 1% 63mW
3774	4822 117 12925	47k 1% 63mW
3781	4822 117 12925	47k 1% 63mW
3782	4822 117 12925	47k 1% 63mW
3783	4822 117 12925	47k 1% 63mW
3785	4822 117 13577	330Ω 1% 1.25W
3786	4822 117 13577	330Ω 1% 1.25W
3787	4822 117 13577	330Ω 1% 1.25W
3788	5322 117 13034	1k5 1% 63mW
3789	5322 117 13043	220Ω 1% 63mW
3790	5322 117 13059	560Ω 1% 63mW
3791	5322 117 13049	470Ω 1% 63mW
3792	4822 051 30102	1k 5% 62mW
3793	4822 051 30222	2k2 5% 62mW
3794	4822 117 12971	15Ω 5% 620mW
3795	4822 051 30339	33Ω 5% 62mW
3800	5322 117 13058	150Ω 1% 63mW
3801	4822 051 30102	1k 5% 62mW
3802	5322 117 13058	150Ω 1% 63mW
3803	5322 117 13058	150Ω 1% 63mW
3804	4822 051 30102	1k 5% 62mW
3805	5322 117 13049	470Ω 1% 63mW
3806	5322 117 13049	470Ω 1% 63mW
3807	5322 117 13068	82Ω 1% 63mW
3808	5322 117 13057	820Ω 1% 63mW
3809	5322 117 13043	220Ω 1% 63mW
3810	4822 051 30391	390Ω 5% 62mW
3811	4822 051 30759	75Ω 5% 62mW
3812	4822 051 30759	75Ω 5% 62mW
3813	4822 051 30391	390Ω 5% 62mW
3814	4822 051 30759	75Ω 5% 62mW
3815	4822 051 30759	75Ω 5% 62mW
3816	4822 051 30391	390Ω 5% 62mW
3817	4822 051 30759	75Ω 5% 62mW
3818	4822 051 30759	75Ω 5% 62mW
3819	4822 051 30759	75Ω 5% 62mW
3820	4822 051 30759	75Ω 5% 62mW
3821	4822 051 30759	75Ω 5% 62mW
3822	4822 051 30759	75Ω 5% 62mW
3823	4822 051 30759	75Ω 5% 62mW
3824	4822 051 30759	75Ω 5% 62mW
3825	5322 117 13058	150Ω 1% 63mW
3826	5322 117 13058	150Ω 1% 63mW
3827	5322 117 13058	150Ω 1% 63mW
9015	4822 051 30008	Jumper
9302	4822 051 30008	Jumper
9303	4822 051 30008	Jumper
9304	4822 051 30008	Jumper
9318	4822 051 30008	Jumper
9322	4822 051 30008	Jumper
9406	4822 051 30008	Jumper
9410	4822 051 30008	Jumper
9413	4822 051 30008	Jumper
9416	4822 051 30008	Jumper
9417	4822 051 30008	Jumper
9418	4822 051 30008	Jumper
9419	4822 051 30008	Jumper
9420	4822 051 30008	Jumper
9520	4822 051 30008	Jumper
9522	4822 051 30008	Jumper
9603	4822 051 30008	Jumper
9604	4822 051 30008	Jumper
9607	4822 051 30008	Jumper
9608	4822 051 30008	Jumper
9609	4822 051 30008	Jumper
9688	4822 051 30008	Jumper
9689	4822 051 30008	Jumper
9691	4822 051 30008	Jumper
9692	4822 051 30008	Jumper
9702	4822 051 30008	Jumper
9704	4822 051 30008	Jumper
9713	4822 051 30008	Jumper
9715	4822 051 30008	Jumper
9716	4822 051 30008	Jumper
9717	4822 051 30008	Jumper
9718	4822 051 30008	Jumper
9719	4822 051 30008	Jumper
9722	4822 051 30008	Jumper
9724	4822 051 30008	Jumper
9725	4822 051 30008	Jumper
9731	4822 051 30008	Jumper
9733	4822 051 30008	Jumper
9735	4822 051 30008	Jumper
9736	4822 051 30008	Jumper
9737	4822 051 30008	Jumper
9738	4822 051 30008	Jumper
9739	4822 051 30008	Jumper
9740	4822 051 30008	Jumper
9741	4822 117 12662	4X10Ω 5%
9744	4822 051 30008	Jumper
9747	4822 051 30008	Jumper
9754	4822 051 30008	Jumper
9760	4822 051 30008	Jumper
9761	4822 051 30008	Jumper
9762	4822 051 30008	Jumper
9763	4822 051 30008	Jumper
9764	4822 051 30008	Jumper
9765	4822 051 30008	Jumper
9768	4822 051 30008	Jumper
9769	4822 051 30008	Jumper
9901	4822 051 30008	Jumper
9902	4822 051 30008	Jumper
9903	4822 051 30008	Jumper
9904	4822 051 30008	Jumper
9905	4822 051 30008	Jumper
9906	4822 051 30008	Jumper
9907	4822 051 30008	Jumper
9908	4822 051 30008	Jumper
9909	4822 051 30008	Jumper
9919	4822 051 30008	Jumper
9920	4822 051 30008	Jumper
9921	4822 051 30008	Jumper
9925	4822 051 30008	Jumper
9927	4822 051 30008	Jumper
9928	4822 051 30008	Jumper
9929	4822 051 30008	Jumper
9935	4822 051 30008	Jumper
9937	4822 051 30008	Jumper
9938	4822 051 30008	Jumper
9939	4822 051 30008	Jumper
9944	4822 051 30008	Jumper
9945	4822 051 30008	Jumper
9946	4822 051 30008	Jumper
9947	4822 051 30008	Jumper
9948	4822 051 30008	Jumper
9949	4822 051 30008	Jumper
9950	4822 051 30008	Jumper
9951	4822 051 30008	Jumper
9952	4822 051 30008	Jumper
9953	4822 051 30008	Jumper
9954	4822 051 30008	Jumper

5301	4822 157 11876	6.8µH 10%
5302	4822 157 11876	6.8µH 10%
5401	4822 157 11876	6.8µH 10%
5403	2422 549 44461	5CCE
5404	2422 535 95427	IND FXD EMI Bead 100MHz 120R
5405	2422 535 95427	IND FXD EMI Bead 100MHz 120R
5406	4822 157 10586	2.2µH 10%
5408	2422 549 44983	IND VAR 5CCB 78mH z PM
5409	2422 535 95427	IND FXD EMI Bead 100MHz 120R
5411	3198 018 32770	0U27 10%
5415	4822 157 11716	BLM21P300SPT
5416	4822 157 11716	BLM21P300SPT
5651	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5652	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5653	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5654	4822 157 11716	BLM21P300SPT
5655	4822 157 11828	22µH 20%
5656	4822 157 11876	6.8µH 10%
5663	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5671	4822 157 11716	BLM21P300SPT
5672	4822 157 11716	BLM21P300SPT
5700	4822 157 10586	2.2µH 10%
5701	4822 157 71304	1µH
5702	4822 157 71304	1µH
5705	4822 156 21729	BK2125HM102-T
5706	4822 157 11716	BLM21P300SPT
5710	4822 156 21729	BK2125HM102-T
5711	4822 156 21729	BK2125HM102-T
5712	4822 156 21729	BK2125HM102-T
5713	4822 157 11716	BLM21P300SPT
5714	4822 157 71206	BLM21A601SPT
5716	4822 156 21729	BK2125HM102-T
5717	4822 156 21729	BK2125HM102-T
5718	4822 157 11716	BLM21P300SPT
5719	4822 156 21729	BK2125HM102-T
5721	4822 157 71206	BLM21A601SPT
5722	4822 156 21729	BK2125HM102-T
5724	4822 156 21729	BK2125HM102-T
5725	4822 157 71206	BLM21A601SPT
5726	4822 156 21729	BK2125HM102-T
5727	4822 156 21729	BK2125HM102-T
5728	4822 157 11716	BLM21P300SPT
5729	4822 157 11716	BLM21P300SPT
5731	4822 156 21729	BK2125HM102-T
5736	4822 157 11876	6.8µH 10%
5737	4822 156 21729	BK2125HM102-T
5738	4822 157 11716	BLM21P300SPT
5739	4822 157 10586	2.2µH 10%
5740	4822 157 10586	2.2µH 10%
5741	4822 157 10586	2.2µH 10%
5742	4822 157 11716	BLM21P300SPT
5743	4822 156 21729	BK2125HM102-T
5744	4822 157 11716	BLM21P300SPT
5900	4822 157 11716	BLM21P300SPT
5901	4822 157 11716	BLM21P300SPT
5902	4822 157 11716	BLM21P300SPT
5903	4822 157 11716	BLM21P300SPT
5904	4822 157 11716	BLM21P300SPT
5910	4822 157 11074	100µH
5911	4822 157 11074	100µH
5912	4822 157 11074	100µH
5913	4822 157 11074	100µH
5914	4822 157 11074	100µH
5915	4822 157 11074	100µH
5917	4822 157 11074	100µH
5918	4822 157 11074	100µH
5919	4822 157 11074	100µH
5920	4822 157 11074	100µH

6001	4822 130 80622	BAT54
6002	4822 130 11397	BAS316
6003	4822 130 80622	BAT54
6004	4822 130 80622	BAT54
6005	4822 130 11422	PLVA2650A
6303	4822 130 11594	BZX284-C47
6304	4822 130 11397	BAS316
6306	3198 020 55680	BZX384-C5V6
6307	4822 130 11528	1PS76SB10
6309	4822 130 11397	BAS316
6310	4822 130 11416	PDZ6.8B
6311	9340 548 67115	PDZ22B

6312	4822 130 11397	BAS316
6313	9322 149 08685	BZM55-C22
6314	4822 130 11397	BAS316
6317	4822 130 11397	BAS316
6319	4822 130 11397	BAS316
6334	4822 130 11397	BAS316
6403	9340 552 30115	BA591
6652	9322 129 40685	BZM55-C10
6657	9322 102 64685	UDZ2.7B
6658	4822 130 11397	BAS316
6926	4822 130 10837	UDZS8.2B
6956	4822 130 10837	UDZS8.2B
6957	4822 130 10837	UDZS8.2B

⊗▭

7001	9352 684 81557	SAA5801H/015
7002	3198 010 42320	BC857BW
7003	3198 010 42310	BC847BW
7004	3198 010 42310	BC847BW
7005	9322 116 74668	LD1117D33
7006	9322 170 36702	LH28F320BJE
7007	9322 157 20668	MSM51V18165F-60J
7008	3198 010 42310	BC847BW
7009	3198 010 42310	BC847BW
7010	3198 010 42320	BC857BW
7011	9322 156 81668	M24C32-WMN6TNKSA
7012	9322 156 72668	M29W400BT-90N1
7013	3198 010 42310	BC847BW
7014	3198 010 42320	BC857BW
7015	4822 209 73852	PMBT2369
7016	4822 209 73852	PMBT2369
7301	9352 681 65518	TDA9330N3
7303	3198 010 42320	BC857BW
7304	9340 310 30215	PDTC144ET
7306	3198 010 42310	BC847BW
7307	9352 630 99118	TDA9181T
7310	3198 010 42310	BC847BW
7311	3198 010 42320	BC857BW
7312	9340 310 30215	PDTC144ET
7313	4822 209 73852	PMBT2369
7314	3198 010 42310	BC847BW
7315	4822 209 73852	PMBT2369
7318	3198 010 42320	BC857BW
7320	3198 010 42310	BC847BW
7322	3198 010 42310	BC847BW
7323	9352 625 24518	TDA9321H
7402	3198 010 42310	BC847BW
7403	5322 130 60159	BC846B
7404	3198 010 42310	BC847BW
7407	4822 130 60373	BC856B
7410	3198 010 42310	BC847BW
7411	5322 130 60159	BC846B
7413	5322 130 42718	BFS20
7651	9322 183 28702	MSP3412G
7652	9351 869 40118	74HC4053PW
7653	9351 869 40118	74HC4053PW
7654	9340 425 20115	BC847BS
7656	9340 425 30115	BC847BPN
7663	9340 425 30115	BC847BPN
7664	9340 425 30115	BC847BPN
7665	9340 425 30115	BC847BPN
7666	9340 425 30115	BC847BPN
7667	3198 010 42310	BC847BW
7668	3198 010 42320	BC857BW
7674	3198 010 42310	BC847BW
7675	9340 425 20115	BC847BS
7677	3198 010 42310	BC847BW
7678	9340 425 20115	BC847BS
7679	9340 425 20115	BC847BS
7680	3198 010 42310	BC847BW
7681	4822 209 31378	NJM4556MB
7682	5322 130 60159	BC846B
7703	4822 209 73852	PMBT2369
7706	9322 142 88668	LF25CDT
7707	5322 130 60159	BC846B
7708	5322 130 60159	BC846B
7709	5322 130 60159	BC846B
7710	5322 130 60159	BC846B
7711	2422 486 80938	32p female
7712	9351 870 00118	74HC573PW
7713	9352 688 09557	SAA4978H/V204
7714	9965 000 02179	MS81V04160-25TB
7715	4822 209 73852	PMBT2369
7717	9352 498 00518	SAA4955TJ/V1
7718	9352 695 58557	SAA4993H/V1
7719	9352 498 00518	SAA4955TJ/V1
7722	9965 000 02179	MS81V04160-25TB
7723	9965 000 02179	MS81V04160-25TB
7724	9322 174 33702	T8F24EF
7725	4822 209 73852	PMBT2369
7726	4822 209 17398	LD1117DT33
7727	9322 170 14668	LF15ABDT
7728	5322 130 42718	BFS20
7729	5322 130 42718	BFS20
7730	5322 130 42718	BFS20
7731	5322 130 42718	BFS20
7732	5322 130 42718	BFS20
7733	5322 130 42718	BFS20

Mainsswitch panel [E]

Various

0001	3104 303 37365	Mains switch
0151	4822 256 10336	LED holder
0151	4822 256 91766	LED holder
0170	4822 256 10562	Photo diode holder
0201	2422 025 16268	2p male
0202	2422 025 16268	2p male
0241	2422 025 06354	9p male
1050	9322 154 48667	TSOP2236UH1
1051	2422 128 02924	Power switch
1051	2422 128 02972	Power switch
8202	3104 311 02571	680 2P3
8946	3104 311 04981	9p 820mm

⊣⊢

2051	4822 124 41584	100µF 10V
2070	4822 126 13879	220nF 16V
2071	4822 124 40248	10µF 50V

─▭─

3050	4822 117 13577	330Ω 5%
3051	4822 051 30471	470Ω 5%
3054	4822 051 20471	470Ω 5%
3057	4822 053 21335	3.3MΩ 5%
3066	4822 053 21335	3.3MΩ 5%
3070	4822 051 30334	330kΩ 5%
3071	4822 051 30334	330kΩ 5%
3072	4822 051 30102	1kΩ 5%
3073	4822 051 30103	10kΩ 5%
3074	4822 051 30472	4.7kΩ 5%
3075	4822 051 30472	4.7kΩ 5%
3076	4822 051 30682	6.8kΩ 5%
3077	4822 051 30103	10kΩ 5%
3078	4822 051 30102	1kΩ 5%
3079	4822 051 30332	3kΩ3 5%
3082	4822 051 30008	Jumper
3998	4822 116 52213	180Ω 5% 62mW

→|

6051	4822 209 72895	TLUV5300
6070	4822 130 11595	BPW46

⊗▭

7070	4822 209 70672	LM358N
7070	4822 209 70672	LM358N

CRT panel [F]

Various

0032	4822 492 70788	Fix IC
0034	4822 492 70788	Fix IC
0036	4822 492 70788	Fix IC
1298	2422 500 80063	10P female
1298	2422 500 80078	CRT socket 11P female
1424	2422 025 11244	7p male
1483	2422 025 16382	3 male
8483	3104 311 03111	3p 340mm

⊣⊢

2312	4822 126 14585	100nF 10% 50V
2313	4822 124 12373	47µF 20% 250V
2318	4822 126 14494	22nF 10% 25V
2319	4822 122 30043	10nF 80% 63V
2324	4822 121 70581	1.5nF 5% 2kV
2324	4822 121 70594	1nF 5% 2kV
2324	5322 121 44356	4.7nF 5% 2kV
2338	4822 121 40518	100nF 10% 250V
2339	4822 121 40518	100nF 10% 250V
2340	4822 121 40518	100nF 10% 250V
2341	2238 586 59812	100nF 50V
2342	4822 126 14241	330pF 50V
2347	4822 124 80791	470µF 20% 16V
2348	5322 126 11583	10nF 10% 50V
2358	4822 124 80791	470µF 20% 16V
2359	5322 126 11583	10nF 10% 50V
2403	4822 124 41584	100µF 20% 10V
2404	4822 124 41584	100µF 20% 10V
2405	4822 122 31177	470pF 10% 500V
2409	5322 126 11583	10nF 10% 50V
2411	4822 126 14494	22nF 10% 25V
2420	4822 126 14238	2.2nF 50V
2427	5322 126 11578	1nF 10% 50V
2428	4822 126 14238	2.2nF 50V
2436	4822 124 40764	22µF 100 V
2437	5322 126 11578	1nF 10% 50V
2438	4822 126 14238	2.2nF 50V
2439	4822 126 14238	2.2nF 50V
2501	2238 586 59812	100nF 50V
2503	2238 586 59812	100nF 50V
2505	2238 586 59812	100nF 50V
2510	4822 126 14585	100nF 10% 50V
2511	4822 126 14585	100nF 10% 50V

─▭─

3301	4822 117 12517	5k6 5% 5W
3304	4822 052 10102	1k 5% 0.33W
3305	4822 052 10108	1Ω 5% 0.33W
3310	4822 051 30102	1k 5% 62mW
3334	4822 050 11002	1k 1% 0.4W
3338	4822 116 83872	220Ω 5% 0.5W
3339	4822 116 83872	220Ω 5% 0.5W
3340	4822 116 83872	220Ω 5% 0.5W
3341	4822 052 11479	47Ω 5% 0.5W
3345	4822 116 52191	33Ω 5% 0.5W
3347	3198 013 01520	1k5 2% 0.5W
3348	4822 117 13016	VDR 1mA/50V
3349	3198 013 01020	1k 2% 0.5W
3350	4822 116 52175	100Ω 5% 0.5W
3351	4822 116 52175	100Ω 5% 0.5W
3352	4822 116 52175	100Ω 5% 0.5W
3356	4822 051 30102	1k 5% 62mW
3401	4822 053 11101	100Ω 5% 2W
3402	4822 116 52176	10Ω 5% 0.5W
3403	4822 052 10108	1Ω 5% 0.33W
3403	4822 052 11108	1Ω 5% 0.5W
3404	4822 052 10108	1Ω 5% 0.33W
3410	4822 117 12968	820Ω 5% 620mW
3411	4822 117 13632	100k 1% 620mW
3412	4822 051 30008	Jumper
3413	4822 117 12968	820Ω 5% 620mW
3416	4822 117 13632	100k 1% 620mW
3417	4822 051 30008	Jumper
3422	4822 051 30008	Jumper
3423	4822 051 30008	Jumper
3424	3198 021 32250	2.2M 5%
3425	3198 021 32250	2.2M 5%
3426	3198 021 32250	2.2M 5%
3427	3198 021 32250	2.2M 5%
3429	4822 051 30102	1k 5% 62mW
3448	4822 117 12968	820Ω 5% 620mW
3449	2120 108 91909	39Ω 5%
3450	4822 051 30102	1k 5% 62mW
3451	4822 051 30479	47Ω 5% 62mW
3452	4822 051 30393	39k 5% 62mW
3453	4822 051 30392	3k9 5% 63mW
3454	4822 117 12968	820Ω 5% 620mW
3455	4822 051 30472	4k7 5% 62mW
3456	4822 051 30101	100Ω 5% 62mW
3458	2120 108 91909	39Ω 5%
3460	4822 051 30101	100Ω 5% 62mW
3470	4822 116 80176	1Ω 5% 0.5W
3471	4822 051 30101	100Ω 5% 62mW
3472	4822 116 80176	1Ω 5% 0.5W
3473	4822 116 80176	1Ω 5% 0.5W
3474	4822 051 30102	1k 5% 62mW
3477	4822 051 30109	10Ω 5% 62mW
3478	4822 116 80176	1Ω 5% 0.5W
3488	4822 051 30109	10Ω 5% 62mW
3501	4822 051 20471	470Ω 5% 0.1W
3502	4822 051 30331	330Ω 5% 62mW
3506	4822 051 30008	Jumper
3508	4822 051 30008	Jumper
3509	4822 051 30471	470Ω 5% 62mW
3510	4822 116 52175	100Ω 5% 0.5W
3510	4822 116 83868	150Ω 5% 0.5W
3511	4822 051 20471	470Ω 5% 0.1W
3512	4822 051 30331	330Ω 5% 62mW
3516	4822 117 13632	100k 1% 620mW
3517	4822 051 30102	1k 5% 62mW
3519	4822 051 30471	470Ω 5% 62mW
3520	4822 116 83868	150Ω 5% 0.5W
3520	4822 116 83881	390Ω 5% 0.5W
3521	4822 051 20471	470Ω 5% 0.1W
3522	4822 051 30331	330Ω 5% 62mW

3526	4822 051 30008	Jumper
3528	4822 051 30008	Jumper
3529	4822 051 30471	470Ω 5% 62mW
3530	4822 116 83868	150Ω 5% 0.5W
3530	4822 116 83876	270Ω 5% 0.5W
3530	4822 116 83881	390Ω 5% 0.5W
3532	4822 051 30008	Jumper
3534	4822 051 30008	Jumper
3535	4822 117 11503	220Ω 1% 0.1W
3536	4822 117 11503	220Ω 1% 0.1W
3537	4822 117 11503	220Ω 1% 0.1W
3538	4822 117 11503	220Ω 1% 0.1W
3539	4822 051 20471	470Ω 5% 0.1W
3540	4822 117 11503	220Ω 1% 0.1W
3541	4822 051 20471	470Ω 5% 0.1W
3542	4822 117 11503	220Ω 1% 0.1W
3543	4822 051 20471	470Ω 5% 0.1W
3544	4822 116 52285	470k 5% 0.5W
3999	4822 117 11817	1k2 1% 62mW
9301	4822 051 30008	Jumper
9302	4822 051 30008	Jumper
9303	4822 051 30008	Jumper
9305	4822 051 30008	Jumper
9306	4822 051 30008	Jumper
9308	4822 051 30008	Jumper
9314	4822 051 30008	Jumper
9401	4822 051 20008	Jumper
9402	4822 051 30008	Jumper
9403	4822 051 30008	Jumper
9427	4822 051 30008	Jumper
9428	4822 051 30008	Jumper
9432	4822 051 30008	Jumper
9433	4822 051 30008	Jumper
9437	4822 051 30008	Jumper
9450	4822 051 20008	Jumper
9452	4822 051 20008	Jumper
9453	4822 051 20008	Jumper
9501	4822 051 30008	Jumper
9502	4822 051 30008	Jumper
9503	4822 051 30008	Jumper

∿∿

5300	2422 531 98035	Transformer S13974-01
5304	4822 526 10704	Bead 100MHz
5308	4822 157 11867	5.6µH 5%
5309	4822 157 11867	5.6µH 5%
5310	4822 157 50964	100µH
5400	4822 157 11869	33µH 10%
5400	4822 157 71467	39µH 10%
5500	2722 122 00332	Delay line 40ns SDL-4693
5501	2722 122 00332	Delay line 40ns SDL-4693
5502	2722 122 00332	Delay line 40ns SDL-4693

▶|

6301	9340 553 52115	BAS321
6302	9340 553 52115	BAS321
6303	9340 553 52115	BAS321
6305	9340 553 52115	BAS321
6306	9340 553 52115	BAS321
6307	9340 553 52115	BAS321
6401	4822 130 11397	BAS316
6402	4822 130 11397	BAS316
6403	4822 130 11397	BAS316
6404	4822 130 11397	BAS316
6405	3139 120 52021	BYV29X-500
6408	4822 117 11373	100Ω 1%
6409	4822 130 11397	BAS316
6410	4822 117 11373	100Ω 1%
6411	4822 130 11397	BAS316
6420	5322 130 34337	BAV99
6421	5322 130 34337	BAV99
6422	5322 130 34337	BAV99
6426	4822 130 30613	BAW62
6427	4822 130 30613	BAW62
6428	4822 130 30613	BAW62
6430	9340 548 61115	PDZ12B

⊗ ▭

7330	9352 694 46112	TDA6118JF
7340	9352 694 46112	TDA6118JF
7350	9352 694 46112	TDA6118JF
7414	5322 130 62804	BCP53
7415	5322 130 63033	BCP56
7422	5322 130 42718	BFS20
7423	5322 130 60159	BC846B
7425	5322 130 42718	BFS20
7426	4822 130 60373	BC856B
7427	5322 130 60159	BC846B
7428	4822 130 60373	BC856B
7429	5322 130 63033	BCP56
7430	5322 130 62804	BCP53
7431	4822 130 60383	BF824
7432	5322 130 42718	BFS20
7500	5322 130 42718	BFS20
7502	4822 130 60373	BC856B
7503	5322 130 42718	BFS20
7505	4822 130 60373	BC856B
7506	5322 130 42718	BFS20
7508	4822 130 60373	BC856B

DC shift panel [G]

Various

0317	4822 265 20723	2p
0318	4822 265 20723	2p
1430	2422 086 10581	Fuse 400mA 65V
8317	3104 311 01421	2p 220mm

⊣⊢

2430	4822 122 31177	470pF 10% 500V
2431	4822 122 31177	470pF 10% 500V

∿∿

5430	3128 138 38911	DC shift coil

▶|

6432	9340 317 00133	BYD33V
6433	9340 317 00133	BYD33V

I/O 3rd scart [H]

Various

1402	4822 267 10596	5p
1680	4822 265 31067	6p
1690	2422 025 16809	8p female
1937	2422 025 12493	10p male
1992	2422 025 16725	21p female
9502	4822 051 20008	Jumper
9503	4822 051 20008	Jumper
9506	4822 051 20008	Jumper
9507	4822 051 20008	Jumper
9508	4822 051 20008	Jumper
9514	4822 051 20008	Jumper
9515	4822 051 20008	Jumper
9523	4822 051 20008	Jumper
9531	4822 051 20008	Jumper

⊣⊢

2500	2020 552 95344	680nF 16V
2501	4822 124 41643	100µF 20% 16V
2502	4822 126 14585	100nF 10% 50V
2503	5322 126 10511	1nF 5% 50V
2504	5322 122 32531	100pF 5% 50V
2505	4822 124 41643	100µF 20% 16V
2506	4822 126 14585	100nF 10% 50V
2507	5322 126 10511	1nF 5% 50V
2508	2020 552 95344	680nF 16V
2509	5322 122 32531	100pF 5% 50V
2513	4822 122 33575	220pF 5% 63V
2514	4822 126 14585	100nF 10% 50V
2517	4822 122 33575	220pF 5% 63V

-▭-

3500	4822 117 13574	1Ω5 5%
3501	4822 051 10102	1k 2% 0.25W
3502	4822 051 20008	Jumper
3503	4822 117 10833	10k 1% 0.1W
3505	4822 117 13574	1Ω5 5%
3506	4822 117 10833	10k 1% 0.1W
3507	4822 051 10102	1k 2% 0.25W
3508	4822 051 20008	Jumper
3512	4822 117 11373	100Ω 1%
3515	4822 117 10837	100k 1% 0.1W
3516	4822 117 10837	100k 1% 0.1W
3517	4822 117 10353	150Ω 1% 0.1W
3518	4822 117 10353	150Ω 1% 0.1W
3519	4822 117 10833	10k 1% 0.1W
3520	4822 117 11373	100Ω 1%
3521	4822 117 11373	100Ω 1%
3522	4822 117 10833	10k 1% 0.1W
3523	4822 051 20472	4k7 5% 0.1W
3524	4822 117 10837	100k 1% 0.1W
3526	4822 117 11373	100Ω 1%
3527	4822 051 10102	1k 2% 0.25W
3528	4822 051 20471	470Ω 5% 0.1W
3533	4822 117 11927	75Ω 1% 0.1W
3538	4822 117 11373	100Ω 1%
3539	4822 117 11927	75Ω 1% 0.1W
3540	4822 117 11373	100Ω 1%
3541	4822 117 11927	75Ω 1% 0.1W
3542	4822 117 11373	100Ω 1%
3543	4822 117 11927	75Ω 1% 0.1W
3544	4822 117 11373	100Ω 1%
3545	4822 117 11927	75Ω 1% 0.1W
3546	4822 051 10102	1k 2% 0.25W
3999	4822 051 10102	1k 2% 0.25W

▶|

6500	4822 130 11416	PDZ6.8B
6501	4822 130 11416	PDZ6.8B
6502	4822 130 11416	PDZ6.8B
6503	4822 130 11416	PDZ6.8B
6504	4822 130 11416	PDZ6.8B
6505	4822 130 11416	PDZ6.8B
6506	4822 130 11416	PDZ6.8B
6507	9340 548 61115	PDZ12B
6509	4822 130 11416	PDZ6.8B
6510	4822 130 11416	PDZ6.8B
6511	4822 130 11416	PDZ6.8B
6512	4822 130 11416	PDZ6.8B

⊗ ▭

7501	5322 209 11578	PCF8574T
7502	5322 130 60159	BC846B
7503	5322 130 60159	BC846B
7505	5322 130 60159	BC846B
7506	4822 130 41246	BC327-25
7507	9340 217 80115	BC847CW

DAF panel [I]

Various

1417	4822 265 20723	2p male
1417	4822 265 20723	2p male
1418	2422 025 16374	2p male
1418	2422 025 16374	2p male
1419	4822 265 20723	2p male
1419	4822 265 20723	2p male
1492	4822 267 10735	3p male
1497	4822 267 10973	1p male
1497	4822 267 10973	1p male
1693	4822 267 10676	1p male
8418	3104 311 01951	2p 560mm

⊣⊢

2800	2222 375 90188	390pF 5% 2kV
2800	2222 375 90498	470pF 5% 2kV
2809	4822 124 40207	100µF 25V
2812	4822 121 70435	10nF 5% 2kV
2813	4822 124 40248	10µF 50V
2814	4822 121 70594	1nF 5% 2kV
2821	2222 479 90166	68nF 5% 400V
2822	4822 121 43856	4nF7 10% 50V
2824	4822 124 40248	10µF 50V
2825	4822 121 51319	1µF 10% 50V
2890	2222 375 90276	220pF 5% 2kV
2890	2222 375 90188	390pF 5% 2kV

-▭-

3807	4822 052 10159	15Ω 5%
3808	4822 052 10159	15Ω 5%
3809	4822 052 10109	10Ω 5%
3810	4822 053 21474	470kΩ 5%
3811	4822 053 20475	4.7MΩ 5%
3812	4822 116 52264	27kΩ 5% 62mW
3813	4822 116 52285	470kΩ 5% 62mW
3814	4822 050 21004	100kΩ 5%
3815	4822 050 11002	1kΩ 5% 62mW
3816	4822 116 52256	2.2kΩ 5% 62mW
3818	4822 051 20333	33kΩ 5%
3820	4822 051 20008	Jumper
3821	4822 051 20008	Jumper
3822	4822 051 20008	Jumper
3823	4822 117 11139	1.5kΩ 5%
3824	4822 051 20333	33kΩ 5%

3826	4822 051 20332	3.3kΩ 5%
3827	4822 051 20562	5.6kΩ 5%
3828	4822 117 10837	100kΩ 5%
3830	4822 117 10834	47kΩ 5%
3831	4822 051 20472	4.7kΩ 5%
3832	4822 051 20182	1.8kΩ 5%
3833	4822 051 20472	4.7kΩ 5%
3898	4822 116 21239	VDR 1mA/612V
3898	4822 116 21239	VDR 1mA/612V
3899	4822 116 21239	VDR 1mA/612V
3899	4822 116 21239	VDR 1mA/612V
3998	4822 116 52213	180Ω 5% 62mW

⌇

5800	4822 148 81242	Coil CU20C2
5800	2422 531 02437	Transformer
5800	2422 531 02437	Transformer
5801	8228 001 34391	Transformer
5810	3128 138 40041	Bridge coil CU15

→|

6810	9340 317 00133	BYD33V
6812	4822 130 34441	BZX79-C22

⊗ ▭

7810	9322 136 03687	STP3NB80FP
7818	5322 130 60159	BC847B
7822	5322 130 60159	BC847B
7823	4822 130 60373	BC857B

Side I/O panel [O]

Various

1326	4822 267 10975	Cinch 3p female
1327	4822 267 31014	SOC PHONE 1p female
1328	2422 026 05133	MDIN 4P female
1936	2422 025 12485	11p male
8936	3104 311 05081	11p 720mm

⊣⊢

2803	5322 126 10733	680pF 50V
2804	5322 122 32531	100pF 50V
2805	5322 122 32531	100pF 50V
2806	5322 126 10733	680pF 50V
2807	4822 126 14076	220nF 25V
2813	4822 124 22652	2µF2 50V
2832	4822 122 33177	10nF 50V
2834	4822 122 33177	10nF 50V
2840	5322 126 10733	680pF 50V
2841	5322 126 10733	680pF 50V

─▭─

3801	4822 117 11927	75Ω 5%
3802	4822 116 52201	75Ω 5% 62mW
3803	4822 050 11002	1kΩ 5% 62mW
3804	4822 050 11002	1kΩ 5% 62mW
3808	4822 051 20008	Jumper
3809	4822 051 20008	Jumper
3814	4822 117 10833	10kΩ 5%
3816	4822 051 20008	Jumper
3826	4822 116 52206	120Ω 5% 62mW
3827	4822 116 52206	120Ω 5% 62mW
3828	4822 116 52206	120Ω 5% 62mW
3829	4822 116 52206	120Ω 5% 62mW
3830	4822 050 21003	10kΩ 5% 62mW
3835	4822 116 52175	100Ω 5% 62mW
3842	4822 050 21003	10kΩ 5% 62mW

→|

6801	9322 129 38685	BZM55-C6V8
6801	4822 130 10852	BZX284-C6V8
6801	4822 130 10794	PDZ6.8B
6802	9322 129 38685	BZM55-C6V8
6802	4822 130 10852	BZX284-C6V8
6802	4822 130 10794	PDZ6.8B
6803	9322 129 38685	BZM55-C10
6803	4822 130 10794	BZX284-C10
6803	4822 130 10794	PDZ10B
6804	9322 129 38685	BZM55-C10
6804	4822 130 10794	BZX284-C10
6804	4822 130 10794	PDZ10B
6805	9322 129 38685	BZM55-C10
6805	4822 130 10794	BZX284-C10
6805	4822 130 10794	PDZ10B
6806	9322 129 38685	BZM55-C10
6806	4822 130 10794	BZX284-C10
6806	4822 130 10794	PDZ10B
6807	9322 129 38685	BZM55-C6V8
6807	4822 130 10852	BZX284-C6V8
6807	4822 130 10794	PDZ6.8B
6808	9322 129 38685	BZM55-C6V8
6808	4822 130 10852	BZX284-C6V8
6808	4822 130 10794	PDZ6.8B

Top control panel [P]

Various

0346	4822 267 10748	3p male
1701	4822 276 13775	Tact switch
1702	4822 276 13775	Tact switch
1703	4822 276 13775	Tact switch
1704	4822 276 13775	Tact switch
1705	4822 276 13775	Tact switch
8346	3104 301 07771	3p 1200mm
8346	3104 311 01401	3p 1500mm

─▭─

3001	4822 051 20391	390Ω 5%
3003	4822 117 13528	200Ω 1%
3005	4822 117 11951	2kΩ 1%
3009	4822 117 11534	1.1kΩ 1%
3011	4822 117 10845	620Ω 1%
3999	4822 051 20471	470Ω 5%

Autoscavem panel [SC]

Various

1440	2422 025 12485	11p male
1940	2422 025 12485	11p male
1955	4822 267 10735	3p
8440	3104 311 05011	11p 340mm

⊣⊢

2006	2238 586 59812	100nF 50V
2008	4822 126 14494	22nF 10% 25V
2010	2238 586 59812	100nF 50V
2012	4822 126 14494	22nF 10% 25V
2014	4822 126 14494	22nF 10% 25V
2016	4822 122 33741	10pF 10% 50V
2020	4822 126 14494	22nF 10% 25V
2038	4822 126 14494	22nF 10% 25V
2040	4822 126 14225	56pF 5% 50V
2208	4822 124 41584	100µF 20% 10V
2210	2238 586 59812	100nF 50V
2212	4822 122 33741	10pF 10% 50V
2600	4822 124 80791	470µF 20% 16V
2602	5322 122 32654	22nF 10% 63V
2605	3198 017 41050	1µF 10V
2607	5322 122 32654	22nF 10% 63V

─▭─

3018	4822 051 30102	1k 5% 62mW
3020	4822 051 30471	470Ω 5% 62mW
3022	4822 051 30393	39k 5% 62mW
3024	4822 051 30103	10k 5% 62mW
3028	4822 051 30223	22k 5% 62mW
3030	4822 051 30683	68k 5% 62mW
3032	4822 117 12903	1k8 1% 63mW
3034	4822 051 30222	2k2 5% 62mW
3036	4822 051 30332	3k3 5% 62mW
3038	4822 051 30561	560Ω 5% 62mW
3040	4822 117 12925	47k 1% 63mW
3042	4822 051 30682	6k8 5% 62mW
3044	4822 051 30102	1k 5% 62mW
3046	4822 051 30102	1k 5% 62mW
3048	4822 051 30102	1k 5% 62mW
3050	4822 051 30561	560Ω 5% 62mW
3052	4822 051 30561	560Ω 5% 62mW
3054	4822 051 30102	1k 5% 62mW
3056	4822 051 30102	1k 5% 62mW
3058	4822 051 30471	470Ω 5% 62mW
3060	4822 051 30471	470Ω 5% 62mW
3062	4822 051 30222	2k2 5% 62mW
3064	4822 117 12971	15Ω 5% 620mW
3066	4822 117 12902	8k2 1% 63mW
3068	4822 051 30681	680Ω 5% 62mW
3070	4822 117 12902	8k2 1% 63mW
3072	4822 051 30152	1k5 5% 62mW
3074	4822 051 30101	100Ω 5% 62mW
3076	4822 117 11817	1k2 1% 62mW
3078	4822 051 30102	1k 5% 62mW
3093	4822 051 30152	1k5 5% 62mW
3106	4822 051 30472	4k7 5% 62mW
3108	4822 051 30273	27k 5% 62mW
3110	4822 051 30392	3k9 5% 63mW
3112	4822 051 30222	2k2 5% 62mW
3114	4822 051 30101	100Ω 5% 62mW
3116	4822 051 30102	1k 5% 62mW
3118	4822 051 30103	10k 5% 62mW
3120	4822 051 30103	10k 5% 62mW
3254	4822 051 30471	470Ω 5% 62mW
3500	4822 051 30101	100Ω 5% 62mW
3502	4822 051 30101	100Ω 5% 62mW
3600	4822 117 11151	1Ω 5%
3999	4822 051 30102	1k 5% 62mW
9000	4822 051 30008	Jumper
9002	4822 051 30008	Jumper
9020	4822 051 30008	Jumper
9045	4822 051 30008	Jumper
9046	4822 051 30008	Jumper

⌇

5600	4822 157 11867	5.6µH 5%
5601	4822 157 11867	5.6µH 5%

→|

6000	5322 130 80119	BBY40

⊗ ▭

7006	5322 130 42718	BFS20
7008	4822 130 60373	BC856B
7010	5322 130 42718	BFS20
7012	5322 130 60159	BC846B
7014	4822 130 60383	BF824
7016	5322 130 42718	BFS20
7018	5322 130 42718	BFS20
7020	4822 130 60383	BF824
7022	5322 130 42718	BFS20
7024	5322 130 42718	BFS20
7026	5322 130 42718	BFS20
7040	5322 130 42718	BFS20
7042	4822 130 60383	BF824
7500	5322 209 90559	TDA8444T